

# Rexroth IndraControl VDP 80.1 Machine Operator Panel Operator Display

R911329156  
Edition 03

Project Planning Manual



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# Table of Contents

	Page
<b>1 About this Documentation.....</b>	<b>3</b>
1.1 Validity of the Documentation.....	3
1.2 Required and Supplementing Documentations.....	3
1.2.1 Selecting.....	3
1.2.2 Configuring.....	3
1.2.3 Commissioning.....	4
1.2.4 Operating.....	4
1.2.5 Maintenance.....	5
1.3 Representing Information.....	5
1.3.1 Safety Instructions.....	5
<b>2 Important Instructions on Use .....</b>	<b>7</b>
2.1 Appropriate Use .....	7
2.1.1 Introduction.....	7
2.1.2 Areas of Application and Use.....	7
2.2 Inappropriate Use.....	8
<b>3 Safety Instructions for Electric Drives and Controls.....</b>	<b>9</b>
3.1 Definitions of Terms.....	9
3.2 General Information.....	10
3.2.1 Using the Safety Instructions and Passing Them on to Others.....	10
3.2.2 Requirements for Safe Use.....	10
3.2.3 Hazards by Improper Use.....	11
3.3 Instructions with Regard to Specific Dangers.....	13
3.3.1 Protection Against Contact With Electrical Parts and Housings.....	13
3.3.2 Protective Extra-Low Voltage as Protection Against Electric Shock .....	14
3.3.3 Protection Against Dangerous Movements.....	14
3.3.4 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting.....	16
3.3.5 Protection Against Contact With Hot Parts.....	16
3.3.6 Protection During Handling and Mounting.....	17
3.3.7 Battery Safety.....	17
3.3.8 Protection Against Pressurized Systems.....	18
3.4 Explanation of Signal Words and the Safety Alert Symbol.....	18
<b>4 Dimensions, Installation and Wiring .....</b>	<b>21</b>
4.1 Dimensions.....	21
4.2 Section.....	26
4.3 System Installation Environment.....	26
4.4 Grounding the VDP 80.1.....	27
4.5 Technical Data.....	27
4.5.1 Display.....	27
4.5.2 Weight.....	28
4.5.3 Standards.....	28

## Table of Contents

	Page
Applied Standards.....	28
CE Conformity Marking.....	28
UL Approval.....	28
<b>5 Design.....</b>	<b>31</b>
5.1 Overview.....	31
5.2 Operating Elements.....	33
<b>6 Connections and Interfaces.....</b>	<b>35</b>
6.1 Interface Connection of HMI Operator Panel Power Supply.....	35
6.2 Interface Connection Data exchange .....	35
6.3 USB Interface.....	36
6.4 Connecting the Extended IO Interface.....	37
6.5 Interface Connection of Handwheel Unit.....	39
6.6 Emergency Stop in Interface for Handwheel Unit.....	44
6.7 Handwheel extended interface (only Universal operator panel) .....	46
<b>7 Universal HMI Panel.....</b>	<b>49</b>
7.1 Labeling Strips.....	49
7.2 Labeling the Labeling Strips.....	49
<b>8 Order Information.....</b>	<b>51</b>
8.1 Type Designation Code.....	51
8.2 Connecting Cables.....	51
<b>9 Accessory.....</b>	<b>53</b>
9.1 Hand-Held Terminal VCH02 Handwheel.....	53
<b>10 Service and Support.....</b>	<b>57</b>
<b>Index.....</b>	<b>59</b>

# 1 About this Documentation

## 1.1 Validity of the Documentation

This project planning manual describes the HMI operator control panel of the CNC "IndraMotion MTX micro" of Bosch Rexroth. The manual contains specifications regarding hardware and interfaces as well as instructions for connecting the operator display and the machine operator panels to turning and milling machines.

This documentation supports the user during the phase

- "mounting".

## 1.2 Required and Supplementing Documentations

### 1.2.1 Selecting

#### Documentation titles with type designation codes and parts numbers

<b>Rexroth IndraMotion MTX micro xxVRS System Description</b> DOK-MTXMIC-SYS*DES*V12-PRxx-EN-P, R911334369 This documentation provides a system overview and describes the product properties of the Rexroth IndraMotion MTX micro.
<b>Rexroth IndraControl VDP 80.1 Machine Operator Panel Operator Display</b> DOK-SUPPL*-VDP*80.1***-PRxx-EN-P, R911329156 This documentation contains a detailed description of the standard interfaced of the HMI operator panel.
<b>Rexroth IndraDrive Drive Controllers HCQ, HCT</b> DOK-INDRV*-HCQ-T+HMQ-T-PRxx-EN-P, R911324185

xx                      Respective version or edition  
*Fig. 1-1:*              *MTX micro documentation overview - Selecting*

### 1.2.2 Configuring

#### Documentation titles with type designation codes and parts numbers

<b>Rexroth IndraMotion MTX micro xxVRS Functional Description</b> DOK-MTXMIC-NC*FUNC*V12-RExx-EN-P, R911334357 This documentation provides information on basic commissioning steps and available functions of the control.
<b>Rexroth IndraMotion MTX micro xxVRS Machine Parameters</b> DOK-MTXMIC-MA*PAR**V12-RExx-EN-P, R911334365 This documentation describes the design and adjustment of the parameters available.
<b>Rexroth IndraMotion MTX xxVRS PLC Interface</b> DOK-MTX***-PLC*INT*V12-PRxx-EN-P, R911334381 This documentation describes interface signals and program function blocks for the integrated PLC.

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*Fig. 1-2:*              *MTX micro documentation overview - Configuring*

About this Documentation

## 1.2.3 Commissioning

### Documentation titles with type designation codes and parts numbers

<p><b>Rexroth IndraMotion MTX micro Easy Setup for Standard Turning and Milling Machines</b> DOK-MTXMIC-EASY*****~COxx-EN-P, R911332281</p> <p>This documentation provides an overview of the components of the IndraMotion MTX micro control system and supports the initial commissioning with handling instructions and examples.</p>
<p><b>Rexroth IndraWorks xxVRS Software Installation</b> DOK-IWORKS-SOFTINS*V12~COxx-EN-P, R911334396</p> <p>This documentation describes the IndraWorks installation.</p>
<p><b>Rexroth IndraWorks xxVRS Engineering</b> DOK-IWORKS-ENGINEE*V12~APxx-EN-P, R911334388</p> <p>This documentation describes the application of IndraWorks in which the Rexroth Engineering tools are integrated. It includes instructions on how to work with IndraWorks and how to operate the oscilloscope function.</p>
<p><b>Rexroth IndraMotion MTX xxVRS Commissioning</b> DOK-MTX***~STARTUP*V12~COxx-EN-P, R911334377</p> <p>This documentation describes the commissioning of the IndraMotion MTX control. Apart from a complete overview, commissioning and configuration of the axes and the user interface as well as the PLC data are described.</p>
<p><b>Rexroth IndraWorks xxVRS IndraLogic 2G Programming Instruction</b> DOK-IWORKS-IL2GPRO*V12~APxx-EN-P, R911334390</p> <p>This documentation describes the PLC programming tool IndraLogic 2G and its application. It includes the basic usage, first steps, visualization, menu items and editors.</p>
<p><b>Rexroth IndraWorks 12VRS Basic Libraries IndraLogic 2G</b> DOK-IL*2G*~BASLIB**V12~LIxx-EN-P, R911333835</p> <p>This documentation describes the system-comprehensive PLC libraries.</p>

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*Fig. 1-3:                      MTX micro documentation overview - Commissioning*

## 1.2.4 Operating

### Documentation titles with type designation codes and parts numbers

<p><b>Rexroth IndraMotion MTX micro xxVRS Standard NC Operation</b> DOK-MTXMIC-NC*OP***V12~APxx-EN-P, R911334373</p> <p>This documentation describes the MMI operating software of the IndraMotion MTX micro.</p>
<p><b>Rexroth IndraMotion MTX micro xxVRS Programming Manual</b> DOK-MTXMIC-NC**PRO*V12~RExx-EN-P, R911334361</p> <p>The following documentation provides information about the standard programming of the Rexroth IndraMotion MTX control micro.</p>

**Rexroth IndraMotion MTX xxVRS Standard NC Cycles**

DOK-MTX\*\*\*-NC\*CYC\*\*V12-PRxx-EN-P, R911334375

This documentation describes the application of the standard cycles of the different technologies for Rexroth IndraMotion MTX control.

**Rexroth IndraMotion MTX xxVRS Block Pre-Run**

DOK-MTX\*\*\*-BLK\*RUN\*V12-APxx-EN-P, R911334379

This documentation explains to the machine manufacturer how to setup the "Block pre-run" function at the machine for the end user.

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*Fig. 1-4:*            *MTX micro documentation overview - Operating*

## 1.2.5 Maintenance

### Documentation titles with type designation codes and parts numbers

**Rexroth IndraMotion MTX xxVRS Diagnostic Messages**

DOK-MTX\*\*\*-DIAGMES\*V11-RExx-EN-P, R911332311

This documentation provides an overview on errors, warnings and messages within the Rexroth IndraMotion MTX control.

xx                      Respective version or edition  
*Fig. 1-5:*            *MTX micro documentation overview - Maintenance*

## 1.3 Representing Information

### 1.3.1 Safety Instructions

The meaning of different warning symbols and signal words in the safety instructions for electric drive and controls can be found under [3.4 Explanation of signal words and the signal graphics, page 18](#).





## 2 Important Instructions on Use

### 2.1 Appropriate Use

#### 2.1.1 Introduction

Bosch Rexroth products represent state-of-the-art development and manufacturing. The products are tested prior to delivery to ensure operating safety and reliability.

#### **WARNING**

**Personal injury and material damages can result from inappropriate use of the products!**

The products are intended for use in the industrial sector and can only be used for the intended purpose. If products are used for any other purpose than the intended purpose, personal injury and material damages can occur.



In case of damages arising from inappropriate use, Bosch Rexroth as manufacturer does not assume any warranty, cannot be held liable and does not compensate for damages. Furthermore, Bosch Rexroth cannot be held liable for any claims for damages. The user bears all risks arising from the inappropriate use of the products.

Before using Bosch Rexroth products, ensure that all the prerequisites for appropriate use of the products are complied with:

- Anyone using Bosch Rexroth products in any way has to read and understand the relevant safety instructions and be familiar with the appropriate use.
- If the products take the form of hardware, their original state may not be modified, i.e., no structural changes are permitted. It is not permitted to decompile software products or to modify the source codes.
- Do not mount damaged or faulty products or use them in operation.
- It has to be ensured that the products have been installed as described in the relevant documentation.

#### 2.1.2 Areas of Application and Use

The VDP 80.1 of Bosch Rexroth is an operator and visualization display.



The VDP 80.1 can only be used with the attachments and accessories specified in this documentation. Components that are not specified may neither be attached nor connected. The same applies to cables and wires.

The unit can only be operated with the configurations and component combinations explicitly specified in this documentation and only with the software and firmware specified in the appropriate functional description.

Typical area of application of the VDP 80.1:

- Machine tools

The operator display VDP 80.1 may only be operated under the assembly and installation conditions, in the specified position of application and under the listed ambient conditions (temperature, degree of protection, humidity, EMC etc.) specified in this documentation.

Important Instructions on Use

## 2.2 Inappropriate Use

Using the VDP 80.1 outside the above-referenced areas of application or under operating conditions other than the conditions described in the documentation and the specified technical data, is defined as "inappropriate use".

The VDP 80.1 cannot be used if

- subjected to conditions that do not comply with the specified ambient conditions. Operation under water, under extreme temperature fluctuations or extreme maximum temperatures is not permitted.
- Furthermore, the operator display shall not be used for applications not expressly approved of by Bosch Rexroth. Also note the information in the general safety instructions!

## 3 Safety Instructions for Electric Drives and Controls

### 3.1 Definitions of Terms

<b>Application Documentation</b>	Application documentation comprises the entire documentation used to inform the user of the product about the use and safety-relevant features for configuring, integrating, installing, mounting, commissioning, operating, maintaining, repairing and decommissioning the product. The following terms are also used for this kind of documentation: User Guide, Operation Manual, Commissioning Manual, Instruction Manual, Project Planning Manual, Application Manual, etc.
<b>Component</b>	A component is a combination of elements with a specified function, which are part of a piece of equipment, device or system. Components of the electric drive and control system are, for example, supply units, drive controllers, mains choke, mains filter, motors, cables, etc.
<b>Control System</b>	A control system comprises several interconnected control components placed on the market as a single functional unit.
<b>Device</b>	A device is a finished product with a defined function, intended for users and placed on the market as an individual piece of merchandise.
<b>Electrical Equipment</b>	Electrical equipment encompasses all devices used to generate, convert, transmit, distribute or apply electrical energy, such as electric motors, transformers, switching devices, cables, lines, power-consuming devices, circuit board assemblies, plug-in units, control cabinets, etc.
<b>Electric Drive System</b>	An electric drive system comprises all components from mains supply to motor shaft; this includes, for example, electric motor(s), motor encoder(s), supply units and drive controllers, as well as auxiliary and additional components, such as mains filter, mains choke and the corresponding lines and cables.
<b>Installation</b>	An installation consists of several devices or systems interconnected for a defined purpose and on a defined site which, however, are not intended to be placed on the market as a single functional unit.
<b>Machine</b>	A machine is the entirety of interconnected parts or units at least one of which is movable. Thus, a machine consists of the appropriate machine drive elements, as well as control and power circuits, which have been assembled for a specific application. A machine is, for example, intended for processing, treatment, movement or packaging of a material. The term "machine" also covers a combination of machines which are arranged and controlled in such a way that they function as a unified whole.
<b>Manufacturer</b>	The manufacturer is an individual or legal entity bearing responsibility for the design and manufacture of a product which is placed on the market in the individual's or legal entity's name. The manufacturer can use finished products, finished parts or finished elements, or contract out work to subcontractors. However, the manufacturer must always have overall control and possess the required authority to take responsibility for the product.
<b>Product</b>	Examples of a product: Device, component, part, system, software, firmware, among other things.
<b>Project Planning Manual</b>	A project planning manual is part of the application documentation used to support the sizing and planning of systems, machines or installations.
<b>Qualified Persons</b>	In terms of this application documentation, qualified persons are those persons who are familiar with the installation, mounting, commissioning and operation of the components of the electric drive and control system, as well as with the hazards this implies, and who possess the qualifications their work requires. To comply with these qualifications, it is necessary, among other things,

## Safety Instructions for Electric Drives and Controls

- 1) to be trained, instructed or authorized to switch electric circuits and devices safely on and off, to ground them and to mark them
- 2) to be trained or instructed to maintain and use adequate safety equipment
- 3) to attend a course of instruction in first aid

**User** A user is a person installing, commissioning or using a product which has been placed on the market.

## 3.2 General Information

### 3.2.1 Using the Safety Instructions and Passing Them on to Others

Do not attempt to install and operate the components of the electric drive and control system without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with these components. If you do not have the user documentation for the components, contact your responsible Bosch Rexroth sales partner. Ask for these documents to be sent immediately to the person or persons responsible for the safe operation of the components.

If the component is resold, rented and/or passed on to others in any other form, these safety instructions must be delivered with the component in the official language of the user's country.

**Improper use of these components, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, could result in property damage, injury, electric shock or even death.**

### 3.2.2 Requirements for Safe Use

Read the following instructions before initial commissioning of the components of the electric drive and control system in order to eliminate the risk of injury and/or property damage. You must follow these safety instructions.

- Bosch Rexroth is not liable for damages resulting from failure to observe the safety instructions.
- Read the operating, maintenance and safety instructions in your language before commissioning. If you find that you cannot completely understand the application documentation in the available language, please ask your supplier to clarify.
- Proper and correct transport, storage, mounting and installation, as well as care in operation and maintenance, are prerequisites for optimal and safe operation of the component.
- Only qualified persons may work with components of the electric drive and control system or within its proximity.
- Only use accessories and spare parts approved by Bosch Rexroth.
- Follow the safety regulations and requirements of the country in which the components of the electric drive and control system are operated.
- Only use the components of the electric drive and control system in the manner that is defined as appropriate. See chapter "Appropriate Use".
- The ambient and operating conditions given in the available application documentation must be observed.
- Applications for functional safety are only allowed if clearly and explicitly specified in the application documentation "Integrated Safety Technology". If this is not the case, they are excluded. Functional safety is a safety

## Safety Instructions for Electric Drives and Controls

concept in which measures of risk reduction for personal safety depend on electrical, electronic or programmable control systems.

- The information given in the application documentation with regard to the use of the delivered components contains only examples of applications and suggestions.

The machine and installation manufacturers must

- make sure that the delivered components are suited for their individual application and check the information given in this application documentation with regard to the use of the components,
  - make sure that their individual application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.
- Commissioning of the delivered components is only allowed once it is sure that the machine or installation in which the components are installed complies with the national regulations, safety specifications and standards of the application.
  - Operation is only allowed if the national EMC regulations for the application are met.
  - The instructions for installation in accordance with EMC requirements can be found in the section on EMC in the respective application documentation.

The machine or installation manufacturer is responsible for compliance with the limit values as prescribed in the national regulations.

- The technical data, connection and installation conditions of the components are specified in the respective application documentations and must be followed at all times.

*National regulations which the user must take into account*

- European countries: In accordance with European EN standards
- United States of America (USA):
  - National Electrical Code (NEC)
  - National Electrical Manufacturers Association (NEMA), as well as local engineering regulations
  - Regulations of the National Fire Protection Association (NFPA)
- Canada: Canadian Standards Association (CSA)
- Other countries:
  - International Organization for Standardization (ISO)
  - International Electrotechnical Commission (IEC)

### 3.2.3 Hazards by Improper Use

- High electrical voltage and high working current! Danger to life or serious injury by electric shock!
- High electrical voltage by incorrect connection! Danger to life or injury by electric shock!
- Dangerous movements! Danger to life, serious injury or property damage by unintended motor movements!
- Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electric drive systems!
- Risk of burns by hot housing surfaces!

## Safety Instructions for Electric Drives and Controls

- Risk of injury by improper handling! Injury by crushing, shearing, cutting, hitting!
- Risk of injury by improper handling of batteries!
- Risk of injury by improper handling of pressurized lines!

## 3.3 Instructions with Regard to Specific Dangers

### 3.3.1 Protection Against Contact With Electrical Parts and Housings



This section concerns components of the electric drive and control system with voltages of **more than 50 volts**.

Contact with parts conducting voltages above 50 volts can cause personal danger and electric shock. When operating components of the electric drive and control system, it is unavoidable that some parts of these components conduct dangerous voltage.

#### **High electrical voltage! Danger to life, risk of injury by electric shock or serious injury!**

- Only qualified persons are allowed to operate, maintain and/or repair the components of the electric drive and control system.
- Follow the general installation and safety regulations when working on power installations.
- Before switching on, the equipment grounding conductor must have been permanently connected to all electric components in accordance with the connection diagram.
- Even for brief measurements or tests, operation is only allowed if the equipment grounding conductor has been permanently connected to the points of the components provided for this purpose.
- Before accessing electrical parts with voltage potentials higher than 50 V, you must disconnect electric components from the mains or from the power supply unit. Secure the electric component from reconnection.
- With electric components, observe the following aspects:  
Always wait **30 minutes** after switching off power to allow live capacitors to discharge before accessing an electric component. Measure the electrical voltage of live parts before beginning to work to make sure that the equipment is safe to touch.
- Install the covers and guards provided for this purpose before switching on.
- Never touch electrical connection points of the components while power is turned on.
- Do not remove or plug in connectors when the component has been powered.
- Under specific conditions, electric drive systems can be operated at mains protected by residual-current-operated circuit-breakers sensitive to universal current (RCDs/RCMs).
- Secure built-in devices from penetrating foreign objects and water, as well as from direct contact, by providing an external housing, for example a control cabinet.

#### **High housing voltage and high leakage current! Danger to life, risk of injury by electric shock!**

- Before switching on and before commissioning, ground or connect the components of the electric drive and control system to the equipment grounding conductor at the grounding points.

## Safety Instructions for Electric Drives and Controls

- Connect the equipment grounding conductor of the components of the electric drive and control system permanently to the main power supply at all times. The leakage current is greater than 3.5 mA.
- Establish an equipment grounding connection with a minimum cross section according to the table below. With an outer conductor cross section smaller than 10 mm<sup>2</sup> (8 AWG), the alternative connection of two equipment grounding conductors is allowed, each having the same cross section as the outer conductors.

Cross section outer conductor	Minimum cross section equipment grounding conductor Leakage current $\geq 3.5$ mA	
	1 equipment grounding conductor	2 equipment grounding conductors
1.5 mm <sup>2</sup> (16 AWG)	10 mm <sup>2</sup> (8 AWG)	2 × 1.5 mm <sup>2</sup> (16 AWG)
2.5 mm <sup>2</sup> (14 AWG)		2 × 2.5 mm <sup>2</sup> (14 AWG)
4 mm <sup>2</sup> (12 AWG)		2 × 4 mm <sup>2</sup> (12 AWG)
6 mm <sup>2</sup> (10 AWG)		2 × 6 mm <sup>2</sup> (10 AWG)
10 mm <sup>2</sup> (8 AWG)		-
16 mm <sup>2</sup> (6 AWG)	16 mm <sup>2</sup> (6 AWG)	-
25 mm <sup>2</sup> (4 AWG)		-
35 mm <sup>2</sup> (2 AWG)		-
50 mm <sup>2</sup> (1/0 AWG)	25 mm <sup>2</sup> (4 AWG)	-
70 mm <sup>2</sup> (2/0 AWG)	35 mm <sup>2</sup> (2 AWG)	-
...	...	...

Fig. 3-1: Minimum Cross Section of the Equipment Grounding Connection

### 3.3.2 Protective Extra-Low Voltage as Protection Against Electric Shock

Protective extra-low voltage is used to allow connecting devices with basic insulation to extra-low voltage circuits.

On components of an electric drive and control system provided by Bosch Rexroth, all connections and terminals with voltages between 5 and 50 volts are PELV ("Protective Extra-Low Voltage") systems. It is allowed to connect devices equipped with basic insulation (such as programming devices, PCs, notebooks, display units) to these connections.

**Danger to life, risk of injury by electric shock! High electrical voltage by incorrect connection!**

If extra-low voltage circuits of devices containing voltages and circuits of more than 50 volts (e.g., the mains connection) are connected to Bosch Rexroth products, the connected extra-low voltage circuits must comply with the requirements for PELV ("Protective Extra-Low Voltage").

### 3.3.3 Protection Against Dangerous Movements

Dangerous movements can be caused by faulty control of connected motors. Some common examples are:



## Safety Instructions for Electric Drives and Controls

- Improper or wrong wiring or cable connection
- Operator errors
- Wrong input of parameters before commissioning
- Malfunction of sensors and encoders
- Defective components
- Software or firmware errors

These errors can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

The monitoring functions in the components of the electric drive and control system will normally be sufficient to avoid malfunction in the connected drives. Regarding personal safety, especially the danger of injury and/or property damage, this alone cannot be relied upon to ensure complete safety. Until the integrated monitoring functions become effective, it must be assumed in any case that faulty drive movements will occur. The extent of faulty drive movements depends upon the type of control and the state of operation.

**Dangerous movements! Danger to life, risk of injury, serious injury or property damage!**

A **risk assessment** must be prepared for the installation or machine, with its specific conditions, in which the components of the electric drive and control system are installed.

As a result of the risk assessment, the user must provide for monitoring functions and higher-level measures on the installation side for personal safety. The safety regulations applicable to the installation or machine must be taken into consideration. Unintended machine movements or other malfunctions are possible if safety devices are disabled, bypassed or not activated.

**To avoid accidents, injury and/or property damage:**

- Keep free and clear of the machine's range of motion and moving machine parts. Prevent personnel from accidentally entering the machine's range of motion by using, for example:
  - Safety fences
  - Safety guards
  - Protective coverings
  - Light barriers
- Make sure the safety fences and protective coverings are strong enough to resist maximum possible kinetic energy.
- Mount emergency stopping switches in the immediate reach of the operator. Before commissioning, verify that the emergency stopping equipment works. Do not operate the machine if the emergency stopping switch is not working.
- Prevent unintended start-up. Isolate the drive power connection by means of OFF switches/OFF buttons or use a safe starting lockout.
- Make sure that the drives are brought to safe standstill before accessing or entering the danger zone.
- Additionally secure vertical axes against falling or dropping after switching off the motor power by, for example,
  - mechanically securing the vertical axes,
  - adding an external braking/arrester/clamping mechanism or
  - ensuring sufficient counterbalancing of the vertical axes.

## Safety Instructions for Electric Drives and Controls

- The standard equipment **motor holding brake** or an external holding brake controlled by the drive controller is **not sufficient to guarantee personal safety!**
- Disconnect electrical power to the components of the electric drive and control system using the master switch and secure them from reconnection ("lock out") for:
  - Maintenance and repair work
  - Cleaning of equipment
  - Long periods of discontinued equipment use
- Prevent the operation of high-frequency, remote control and radio equipment near components of the electric drive and control system and their supply leads. If the use of these devices cannot be avoided, check the machine or installation, at initial commissioning of the electric drive and control system, for possible malfunctions when operating such high-frequency, remote control and radio equipment in its possible positions of normal use. It might possibly be necessary to perform a special electromagnetic compatibility (EMC) test.

### 3.3.4 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated by current-carrying conductors or permanent magnets of electric motors represent a serious danger to persons with heart pacemakers, metal implants and hearing aids.

**Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electric components!**

- Persons with heart pacemakers and metal implants are not allowed to enter the following areas:
  - Areas in which components of the electric drive and control systems are mounted, commissioned and operated.
  - Areas in which parts of motors with permanent magnets are stored, repaired or mounted.
- If it is necessary for somebody with a heart pacemaker to enter such an area, a doctor must be consulted prior to doing so. The noise immunity of implanted heart pacemakers differs so greatly that no general rules can be given.
- Those with metal implants or metal pieces, as well as with hearing aids, must consult a doctor before they enter the areas described above.

### 3.3.5 Protection Against Contact With Hot Parts

**Hot surfaces of components of the electric drive and control system. Risk of burns!**

- Do not touch hot surfaces of, for example, braking resistors, heat sinks, supply units and drive controllers, motors, windings and laminated cores!
- According to the operating conditions, temperatures of the surfaces can be **higher than 60 °C (140 °F)** during or after operation.
- Before touching motors after having switched them off, let them cool down for a sufficient period of time. Cooling down can require **up to 140 minutes!** The time required for cooling down is approximately five times the thermal time constant specified in the technical data.

## Safety Instructions for Electric Drives and Controls

- After switching chokes, supply units and drive controllers off, wait **15 minutes** to allow them to cool down before touching them.
- Wear safety gloves or do not work at hot surfaces.
- For certain applications, and in accordance with the respective safety regulations, the manufacturer of the machine or installation must take measures to avoid injuries caused by burns in the final application. These measures can be, for example: Warnings at the machine or installation, guards (shieldings or barriers) or safety instructions in the application documentation.

### 3.3.6 Protection During Handling and Mounting

**Risk of injury by improper handling! Injury by crushing, shearing, cutting, hitting!**

- Observe the relevant statutory regulations of accident prevention.
- Use suitable equipment for mounting and transport.
- Avoid jamming and crushing by appropriate measures.
- Always use suitable tools. Use special tools if specified.
- Use lifting equipment and tools in the correct manner.
- Use suitable protective equipment (hard hat, safety goggles, safety shoes, safety gloves, for example).
- Do not stand under hanging loads.
- Immediately clean up any spilled liquids from the floor due to the risk of falling!

### 3.3.7 Battery Safety

Batteries consist of active chemicals in a solid housing. Therefore, improper handling can cause injury or property damage.

**Risk of injury by improper handling!**

- Do not attempt to reactivate low batteries by heating or other methods (risk of explosion and cauterization).
- Do not attempt to recharge the batteries as this may cause leakage or explosion.
- Do not throw batteries into open flames.
- Do not dismantle batteries.
- When replacing the battery/batteries, do not damage the electrical parts installed in the devices.
- Only use the battery types specified for the product.



Environmental protection and disposal! The batteries contained in the product are considered dangerous goods during land, air, and sea transport (risk of explosion) in the sense of the legal regulations. Dispose of used batteries separately from other waste. Observe the national regulations of your country.

---

## Safety Instructions for Electric Drives and Controls

### 3.3.8 Protection Against Pressurized Systems

According to the information given in the Project Planning Manuals, motors and components cooled with liquids and compressed air can be partially supplied with externally fed, pressurized media, such as compressed air, hydraulics oil, cooling liquids and cooling lubricants. Improper handling of the connected supply systems, supply lines or connections can cause injuries or property damage.

#### Risk of injury by improper handling of pressurized lines!

- Do not attempt to disconnect, open or cut pressurized lines (risk of explosion).
- Observe the respective manufacturer's operating instructions.
- Before dismantling lines, relieve pressure and empty medium.
- Use suitable protective equipment (safety goggles, safety shoes, safety gloves, for example).
- Immediately clean up any spilled liquids from the floor due to the risk of falling!



Environmental protection and disposal! The agents (e.g., fluids) used to operate the product might not be environmentally friendly. Dispose of agents harmful to the environment separately from other waste. Observe the national regulations of your country.

## 3.4 Explanation of Signal Words and the Safety Alert Symbol

The Safety Instructions in the available application documentation contain specific signal words (DANGER, WARNING, CAUTION or NOTICE) and, where required, a safety alert symbol (in accordance with ANSI Z535.6-2006).

The signal word is meant to draw the reader's attention to the safety instruction and identifies the hazard severity.

The safety alert symbol (a triangle with an exclamation point), which precedes the signal words DANGER, WARNING and CAUTION, is used to alert the reader to personal injury hazards.

#### DANGER

In case of non-compliance with this safety instruction, death or serious injury **will** occur.

#### WARNING

In case of non-compliance with this safety instruction, death or serious injury **could** occur.

#### CAUTION

In case of non-compliance with this safety instruction, minor or moderate injury **could** occur.

Safety Instructions for Electric Drives and Controls

---

***NOTICE***

In case of non-compliance with this safety instruction, property damage could occur.

---



# 4 Dimensions, Installation and Wiring

## 4.1 Dimensions

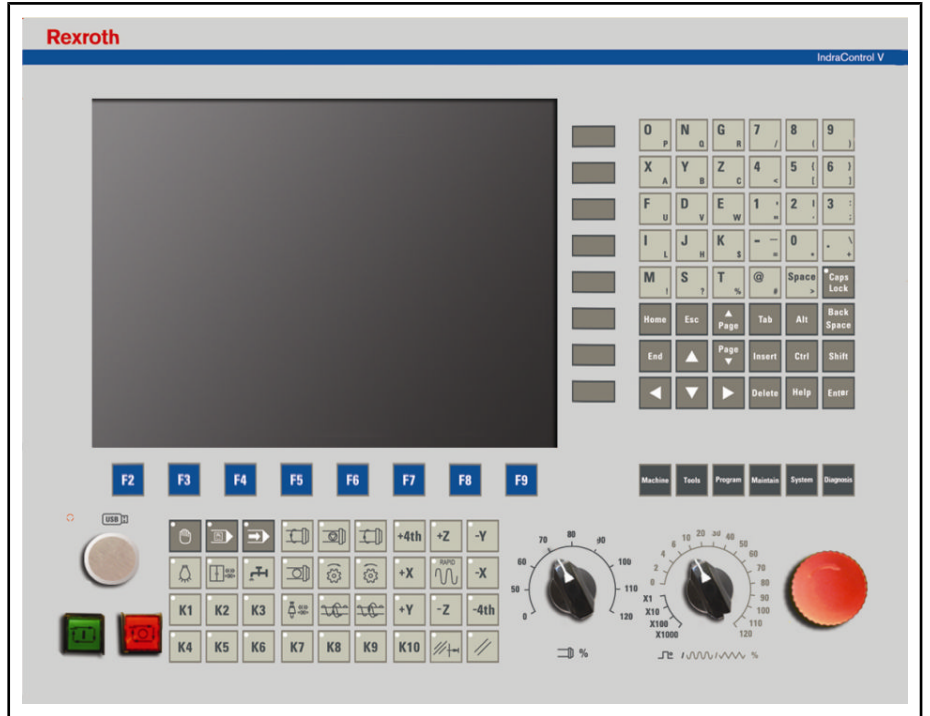


Fig.4-1: Front panel of the VDP 80.1-FB, CNC milling (light gray)



Fig.4-2: Front panel of the VDP 80.1-FH, CNC milling (graphite gray)

Dimensions, Installation and Wiring

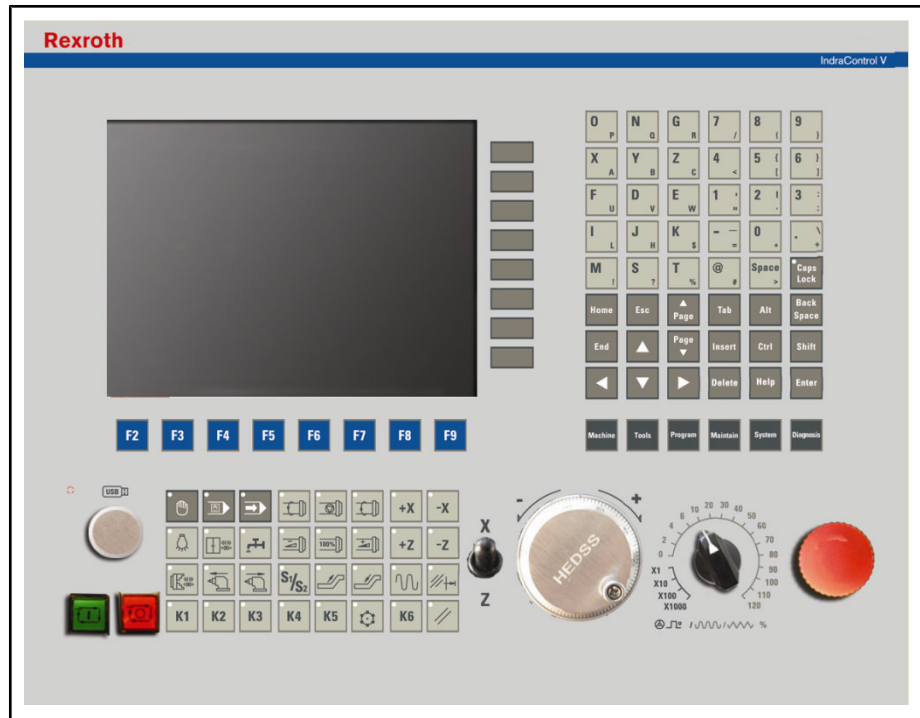


Fig.4-3: Front panel of the VDP 80.1-FA, CNC turning (light gray)



Fig.4-4: Front panel of the VDP 80.1-FG, CNC turning (graphite gray)



Dimensions, Installation and Wiring

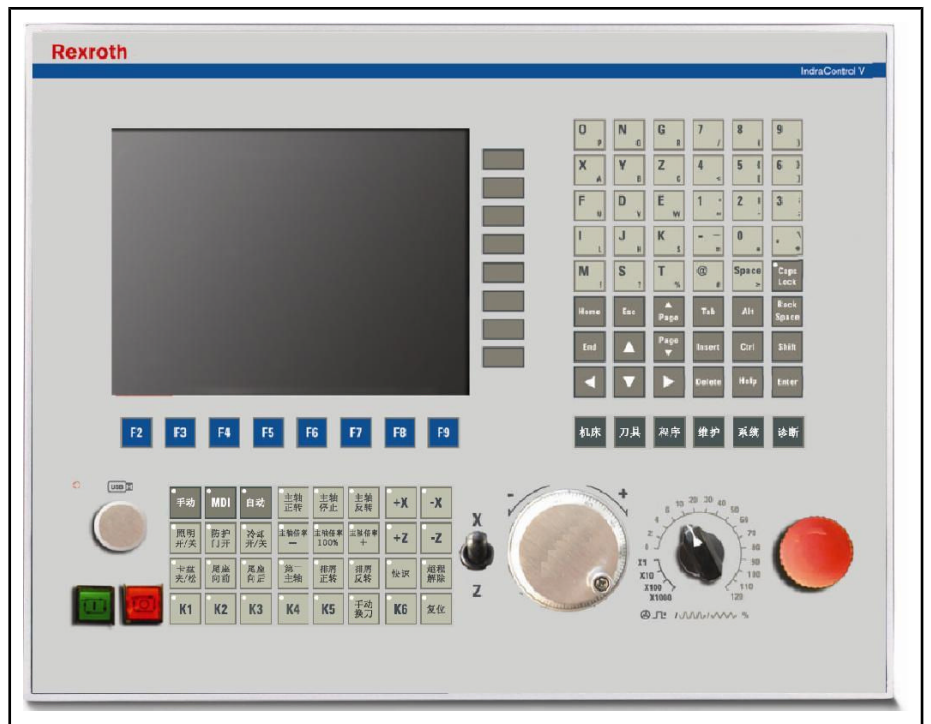


Fig.4-5: Front panel of the VDP 80.1-FA, CNC turning (light gray, Chinese design)



Fig.4-6: Front panel of the VDP 80.1-FK, CNC universal (graphite gray)

Dimensions, Installation and Wiring

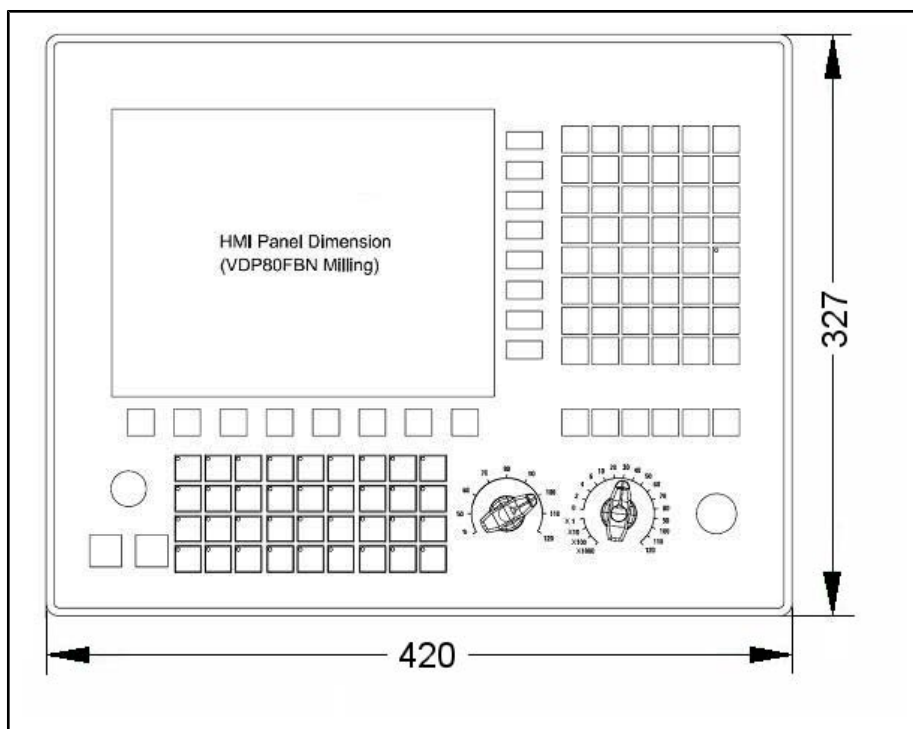


Fig.4-7: VDP 80.1 dimensions, CNC milling

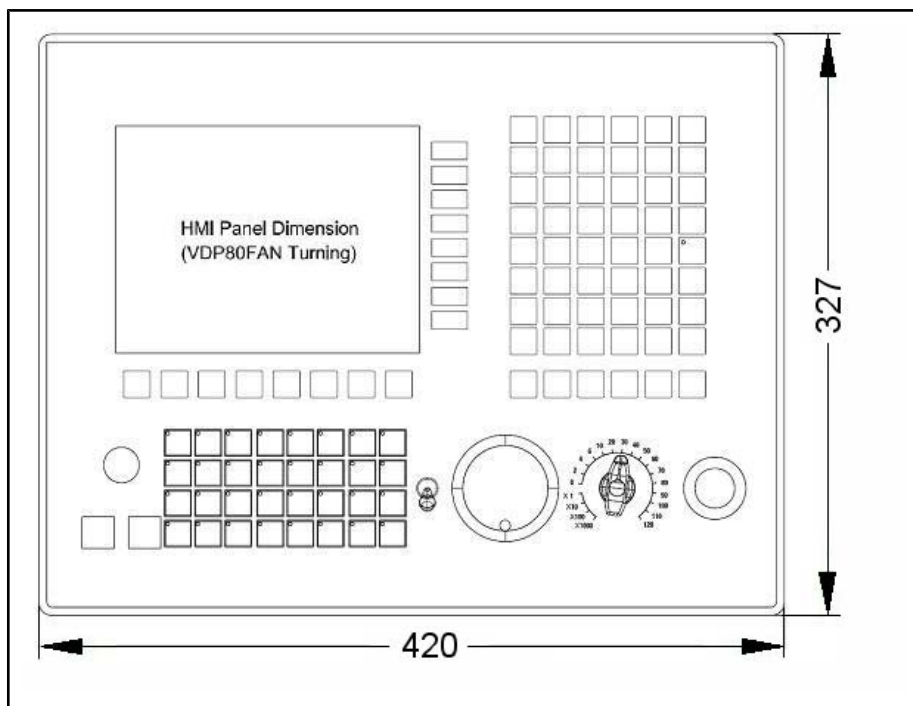


Fig.4-8: VDP 80.1 dimensions, CNC turning

Dimensions, Installation and Wiring

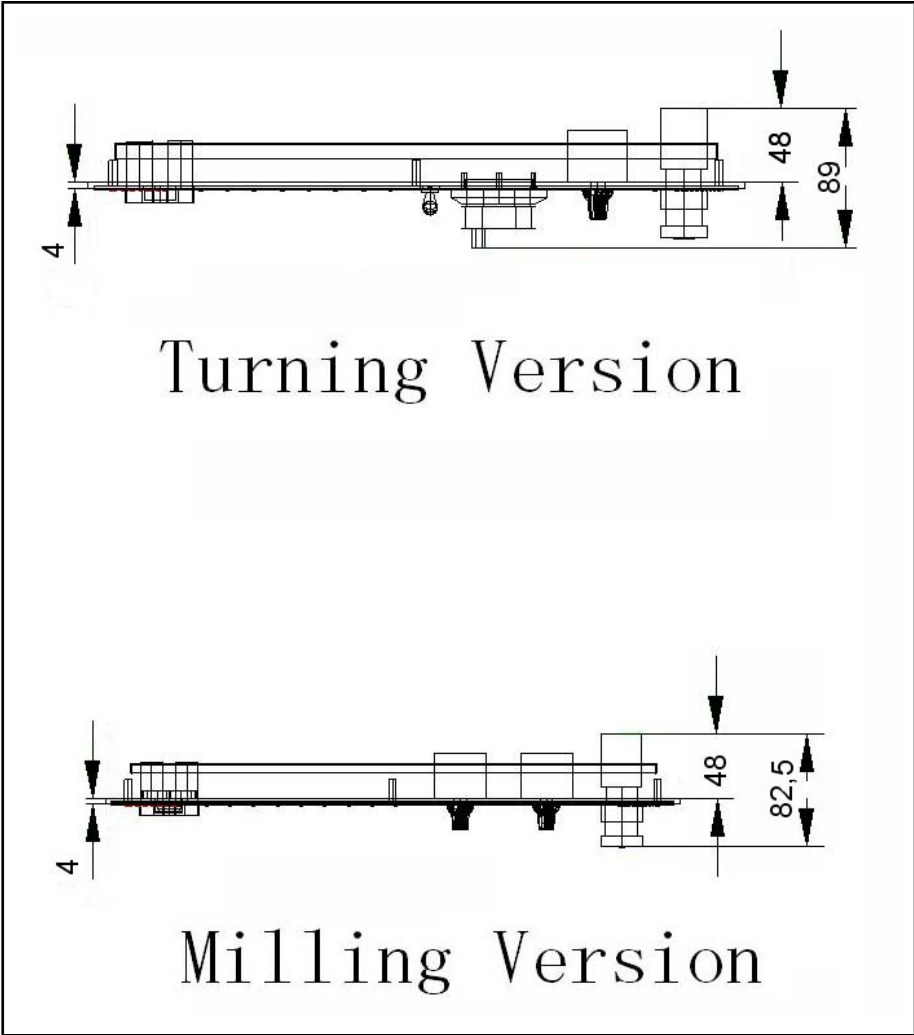


Fig.4-9: Top view

## Dimensions, Installation and Wiring

## 4.2 Section

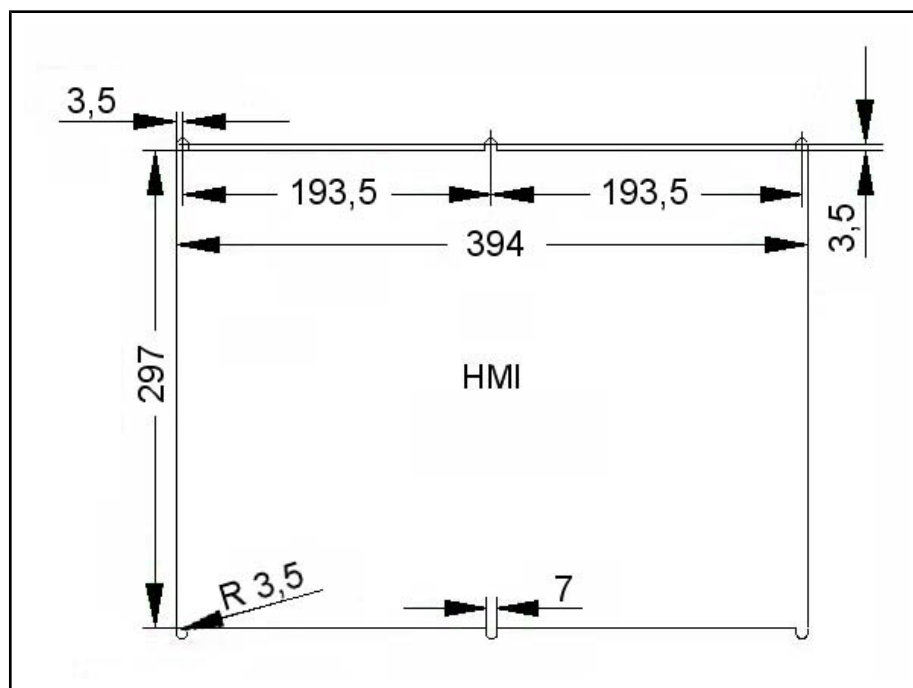


Fig.4-10: HMI operator panel, section template



When designing the housing for the HMI operator panel, please take the height of the plug-in connections and the permissible bending radius for the cables into consideration.

## 4.3 System Installation Environment

The HMI operator panel VDP 80.1 has to be handled with care. The housing of the VDP 80.1 has to be sealed and dust-proof. Only if the housing is sealed and dust-proof, the VDP 80.1 is protected against coolant splashes or dust accumulating during machining.

Ambient conditions:

- Ambient temperature during operation: 0 °C to 45 °C
- Storage and transport temperature: -20 °C to 60 °C
- Changing the ambient temperature:  $\leq 1,1$  °C/min
- Relative humidity:  $\leq 75\%$
- Oscillations:  $\leq 0.5$  G
- Active power: 24 V DC  $\pm 10\%$  2 A
- Protection class: IP 54 (system input), IP 00 (system output)

Please note the following points to comply with the afore-mentioned conditions:

- The HMI operator panel requires a sealed housing. Sealant has to be applied to doors and cable outputs.
- The HMI operator panel housing has to be dust-proof and impermeable to water (also to coolant etc.).
- The HMI operator panel housing has to be sufficiently large to ensure heat dissipation. During operation, the difference between inside and outside air temperature cannot exceed 10 °C.

## Dimensions, Installation and Wiring

- The HMI operator panel housing has to be equipped with a fan. However, the fan should be positioned directly at the operator to prevent dust from settling on it.
- Installing a filter device for ventilation purposes is recommended. Additionally, a heat exchanger has to be installed in case of a considerably high ambient temperature.
- The EMB of the housing for the HMI operator panel has to be taken into consideration.

The components in the HMI operator panel housing have to be positioned to facilitate easy access during maintenance work.

## 4.4 Grounding the VDP 80.1

The VDP 80.1 has to be grounded to ensure correct operation. The required minimum cable cross section is 2 mm<sup>2</sup>.

GND in the grounding diagram stands for the service ground of the system, supplying the reference voltage 0 V. FG stands for shield ground, reducing the cross interferences.



The shielding of the connecting cable has to be soldered properly with the jacket of the cable connector for all parts of the system.

All shieldings of the electronic unit should be connected to GND.

## 4.5 Technical Data

### 4.5.1 Display

	VDP 80.1, CNC milling	VDP 80.1, CNC turning
Display area	211.2 (H) x 158.4 mm (V)	170.88 (H) x 128.16 mm (V)
Diagonal display size	26 cm (10.4 inch)	21 cm (8.4 inch)
Screen actuation	a-Si TFT Active matrix	a-Si TFT Active matrix
Display colors	262.144 colors	262.144 colors
Resolution	640 (H) x 480 pixel (V)	640 (H) x 480 pixel (V)
Cycle life of backlight	50.000 hrs	50.000 hrs

Fig. 4-11: Technical data display

Ambient temperature: 25 °C



Cycle life of backlight:

The cycle life of the backlight is limited to a certain amount of operating hours. Once the time has lapsed, the brightness of the backlight only amounts to 50% of the original value.



LCD display:

The readability of the LCD display continuously decreases due to a low backlight. In this case, the backlight has to be exchanged. Please contact the Bosch Rexroth service for further information.

## Dimensions, Installation and Wiring

## 4.5.2 Weight

Device	Weight
VDP 80.1, CNC milling	ca. 2.6 kg
VDP 80.1, CNC turning	ca. 2.6 kg

*Fig.4-12: Weight*

## 4.5.3 Standards

### Applied Standards

The HMI operator panel VDP 80.1 complies with the following standards:

Standard	Description
EN 60204-1	Electric machine equipment
EN 61000-6-4	Generic standards – Electromagnetic emission for industrial sectors
EN 61000-6-2	Generic standards – Electromagnetic emission for industrial sectors
EN 61558-2-6	Transformer safety for 24-V power supply units
EN 60664-1	Overvoltage category II
EN 61131-2	24-V output requirements
EN 61131-2	24-V power supply requirements
EN 60529	Protection classes (incl. housing and built-in compartments)
EN 60068-2-6	Test procedure: Oscillate
EN 60068-2-27	Test procedure: Shock
EN 60721-3-1 and 60721-3-3	Classification of ambient conditions
ISO 13850	Machine safety – EMERGENCY STOP – Design guidelines

*Fig.4-13: Applied Standards*

## CE Conformity Marking

Declaration of conformity



The electronic products described in the project planning manual meet the requirements and targets of the following EC Directive and comply with the recognized European Standard:

EMC directive 2004/108/EG

The electronic products described in the project planning manual meet the operating requirements in the industrial sectors:

- EN 61000-6-2-2005
- EN 61000-6-4-2007

## UL Approval



## Dimensions, Installation and Wiring

The HMI operator panels of the VDP 80 series are approved in compliance with the following standard:

- **UL508** (industrial control systems)

In combinations or extensions, approvals can be limited or missing. That is why the approval has to be checked at the device by means of the UL marking.

To ensure an operation according to the UL standard, the following requirements have to be met:

- Only insulated copper wire 75 °C / 167 °F has to be used.

The UL mark only applies to the device in delivery status (ex works). The compliance with UL requirements has to be checked after changes have been made to the device, e.g. after additional extension cards have been plugged in.

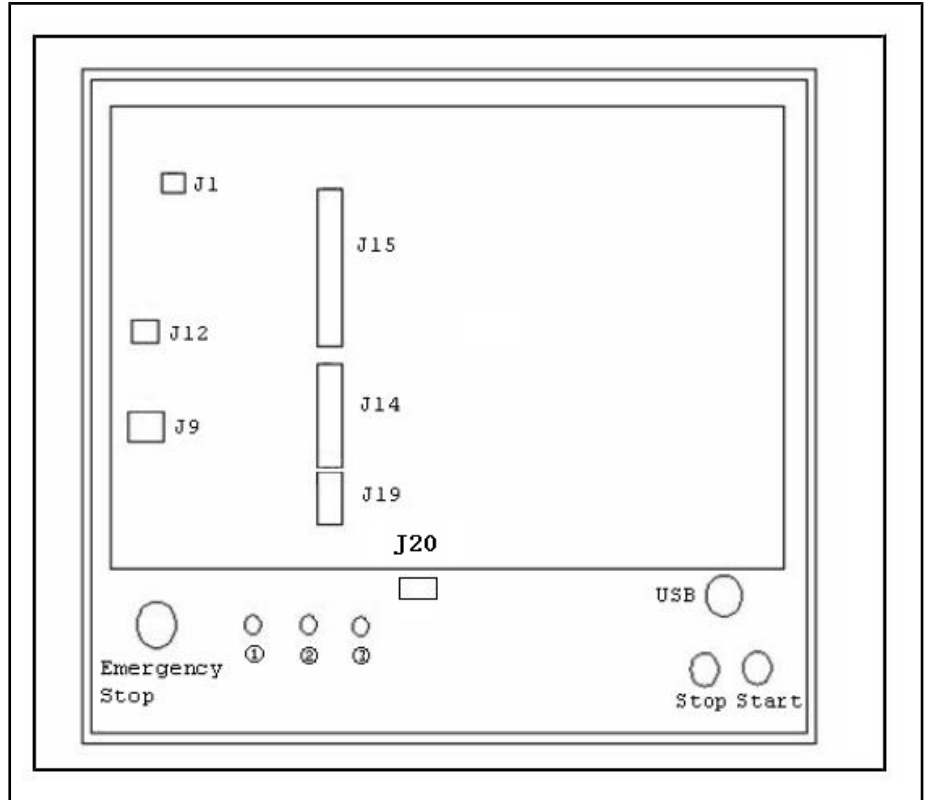




# 5 Design

## 5.1 Overview

Overview of the HMI operator panel interfaces



- ① CNC turning: Override / CNC milling: Override
- ② CNC turning: Handwheel/CNC milling: Spindle override
- ③ CNC turning: X-Z

Fig. 5-1: Rear view of HMI operator panel

Interface number	List of VDP 80.1 interfaces Interface type	Interface description	Remarks
J1	Connector, 2-pin Distance 5.08 mm	Power supply interface	24 V DC power supply (see chapter 6.1 "Interface Connection of HMI Operator Panel Power Supply" on page 35)
J12	Connecting box 1394	Interface for data exchange	(see chapter 6.2 "Interface Connection Data exchange" on page 35)
J9	USB2A connection	USB interface	(see chapter 6.3 "USB Interface" on page 36)
J15	IDC50 connection	Extended IO interface	Open collector outputs (see chapter 6.4 "Connecting the Extended IO Interface" on page 37)
J14	D-SUB connection, 25-pin 25P-M (pin)	Interface for handwheel unit	Open collector outputs (see fig. 6-11 "Handwheel unit - Output of type open collector" on page 41) Differential inputs (see fig. 6-13 "Handwheel unit - Input of type differential" on page 43)

Design

Interface number	Interface type	Interface description	Remarks
J19	Connector, 4-pin Distance 2.54 mm	Emergency Stop in hand-wheel interface	(see chapter 6.6 "Emergency Stop in Interface for Handwheel Unit" on page 44)
J20	Connector, 4-pin Distance 3.81 mm	Interface for additional hand-wheel	This interface is only intended for the Universal operator panel

Fig.5-2: VDP 80.1, control interfaces

VDP 80.1, connection diagram

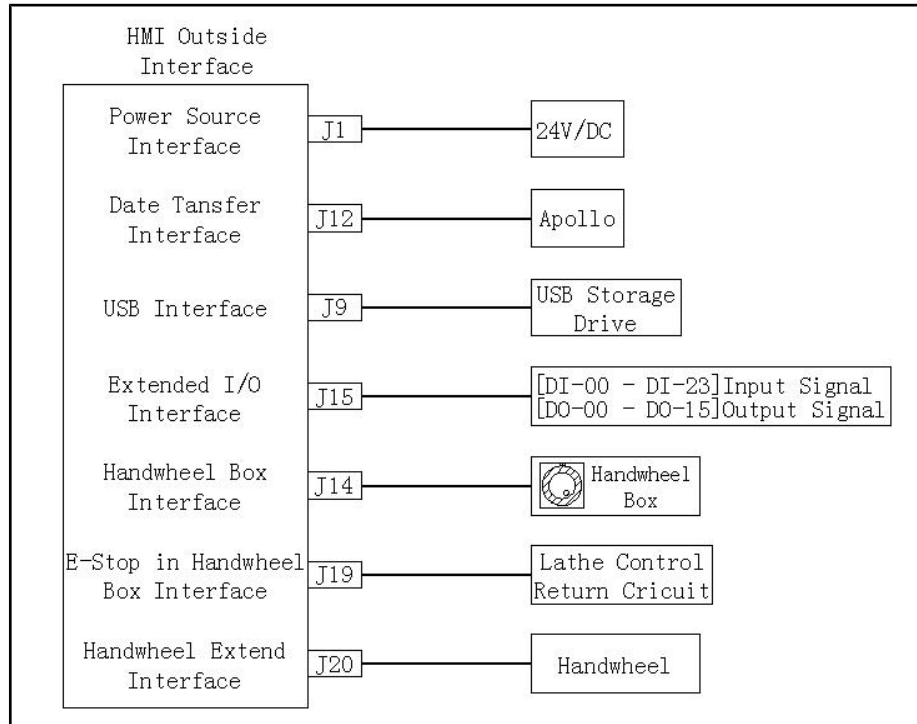


Fig.5-3: HMI operator panel, connection diagram

## 5.2 Operating Elements

Keyboard layout on the HMI operator panel, CNC milling

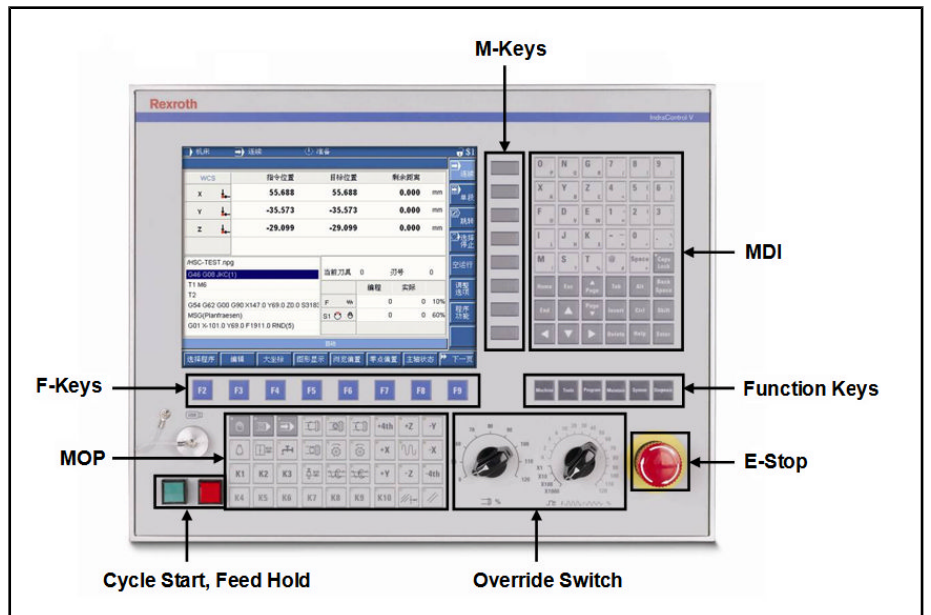


Fig.5-4: Keyboard layout on the HMI operator panel VDP 80.1, CNC milling

Keyboard layout on the HMI operator panel, CNC turning

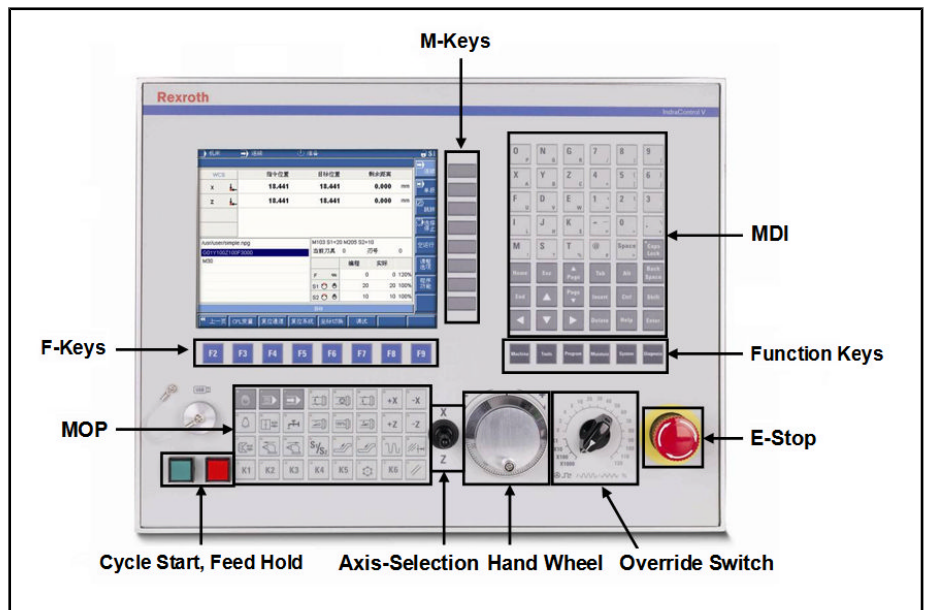


Fig.5-5: Keyboard layout on the HMI operator panel VDP 80.1, CNC turning



## 6 Connections and Interfaces

### 6.1 Interface Connection of HMI Operator Panel Power Supply

Pin assignment J1

Pin no.	Assignment
01	+24V
02	0V

Fig. 6-1: Pin assignment J1

Detailed description

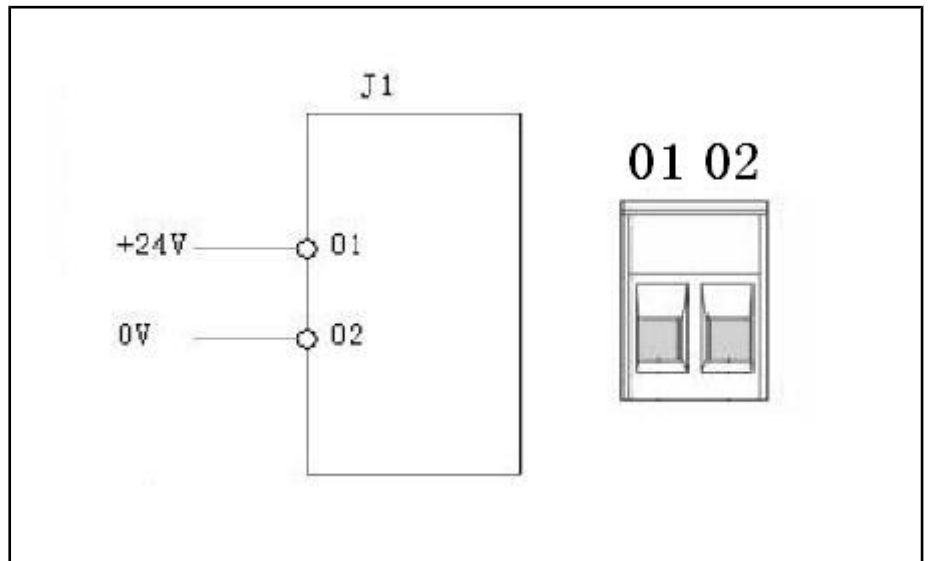


Fig. 6-2: Power supply interface

Technical data:

- Nominal input: 24 V DC  $\pm 20\%$
- Nominal current: 2 A
- Operating conditions: 0–45 °C, 20%–90% relative humidity (no dew)

### 6.2 Interface Connection Data exchange

Pin assignment J12

Pin no.	Assignment	Pin no.	Assignment
06	USB+	05	USB-
04	LVDS+	03	LVDS-
02	GND	01	GND

Fig. 6-3: Pin assignment J12



The HMI operator panel can be connected to the MTX micro via a data connection cable.

Max. cable length: 10 m.

Order information can be found under chapter [8.2 Connection cable, page 51](#).

Connections and Interfaces

Signal connection diagram

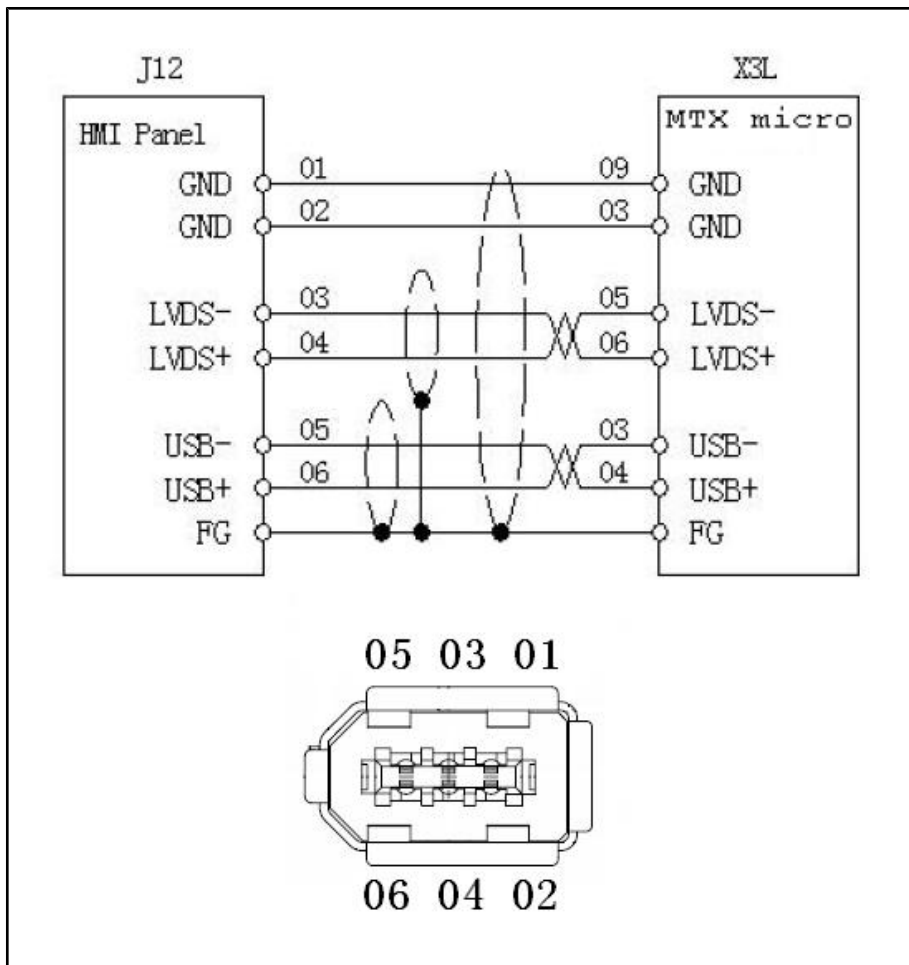


Fig.6-4: Interface for data exchange

Signal description

Signal	Description
GND	Signal ground connection
LVDS-	Signal display
LVDS+	Signal display
USB-	USB signal
USB+	USB signal
FG	Shielding

### 6.3 USB Interface

Pin assignment J9

Pin no.	Assignment	Pin no.	Assignment
01	+5V	05	+5V
02	D-	06	D-
03	D+	07	D+
04	GND	08	GND

Fig.6-5: Pin assignment J9

## Signal connection diagram

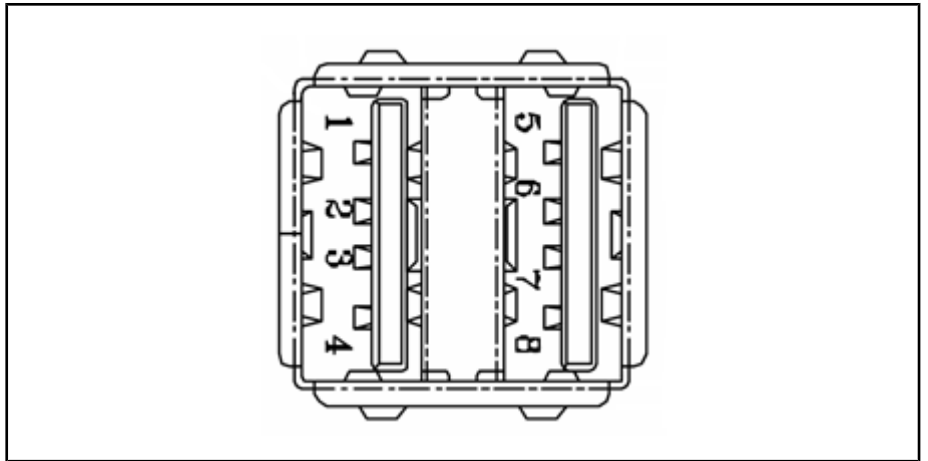


Fig. 6-6: Signal connection USB interface



This interface is a standard USB-A connection that is only intended for USB flash drives.

The power consumption of the connected device cannot exceed 500 mA per USB interface. The total current of all USB devices cannot exceed 1 A. Permissible length of the USB connection cable: max. 3.0 m.

## 6.4 Connecting the Extended IO Interface

### Pin assignment J15

Pin no.	Assignment	Pin no.	Assignment
01	DI-00	26	DO-01
02	DI-01	27	DO-02
03	DI-02	28	DO-03
04	DI-03	29	DO-04
05	DI-04	30	DO-05
06	DI-05	31	DO-06
07	DI-06	32	DO-07
08	DI-07	33	DO-08
09	DI-08	34	DO-09
10	DI-09	35	DO-10
11	DI-10	36	DO-11
12	DI-11	37	DO-12
13	DI-12	38	DO-13
14	DI-13	39	DO-14
15	DI-14	40	DO-15
16	DI-15	41	-
17	DI-16	42	-
18	DI-17	43	-

Connections and Interfaces

Pin no.	Assignment	Pin no.	Assignment
19	DI-18	44	-
20	DI-19	45	-
21	DI-20	46	-
22	DI-21	47	COM+
23	DI-22	48	COM+
24	DI-23	49	COM-
25	DO-00	50	COM-

Fig.6-7: Pin assignment J15

Signal connection diagram

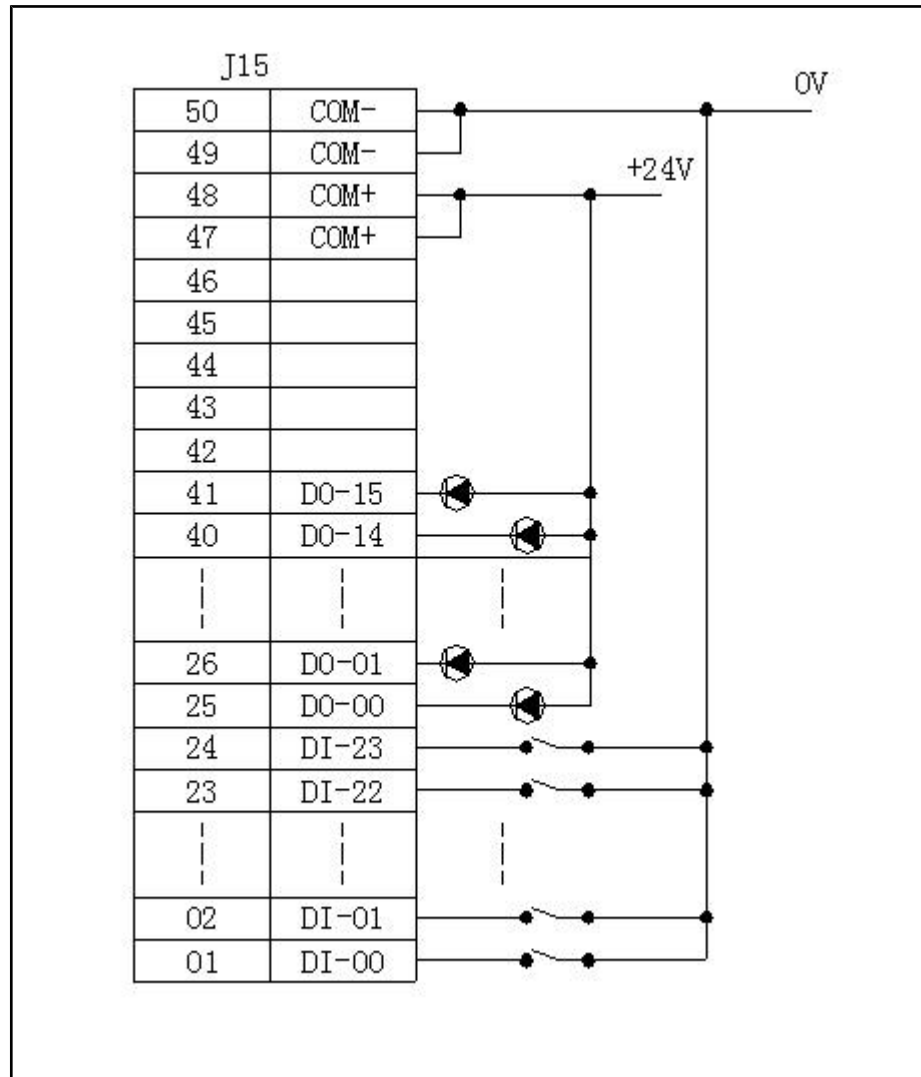


Fig.6-8: Extended IO interface (circuit)



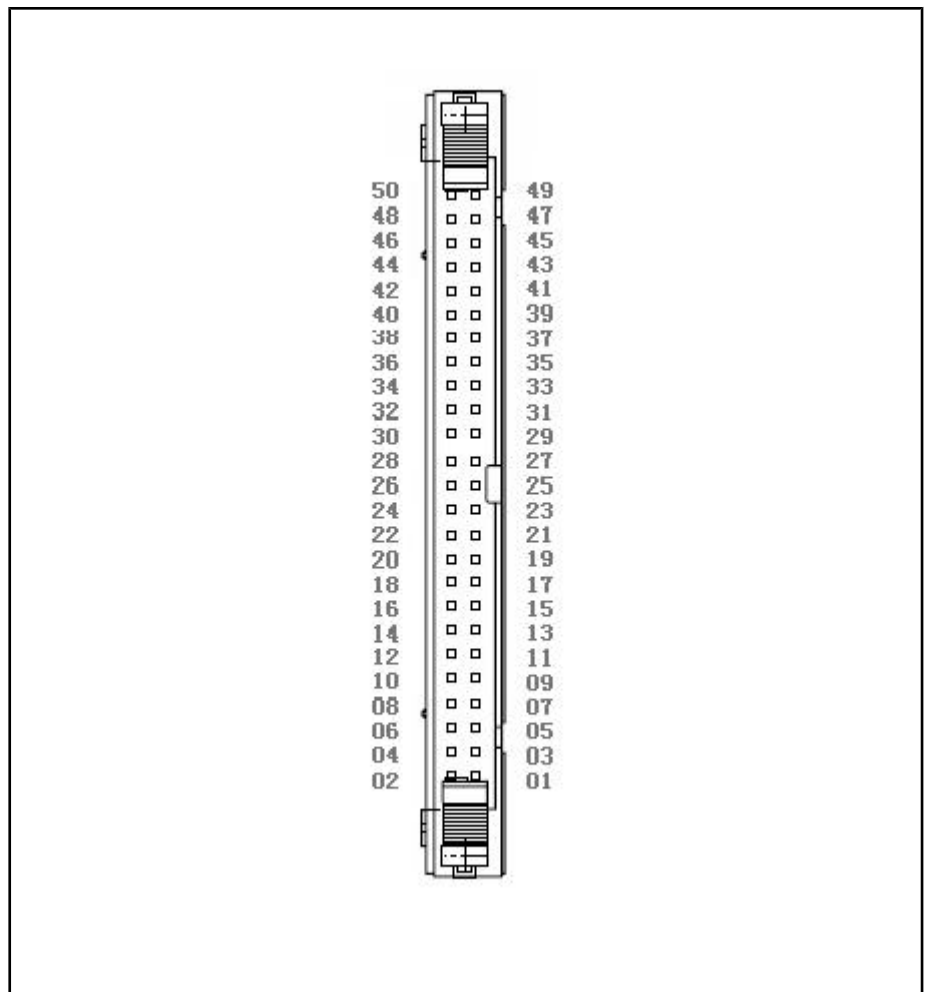


Fig. 6-9: Extended IO interface (plug connector)



**Check the total current!**

The total current of all outputs cannot exceed 1 A. The current for an individual output cannot exceed a maximum of 100 mA.



**Check the polarity!**

Verify the correct signal interface polarity as an incorrect connection can result in fusing of the IO interface.

Check the correct position of the connection!

Signal description

Signal description	Description
DI-00 to DI-23	Digital input 24 bits
DO-00 to DO-15	Digital output 16 bits
COM+	Output 24V
COM-	0V

## 6.5 Interface Connection of Handwheel Unit

Pin assignment J14

## Connections and Interfaces

Pin no.	Assignment	Pin no.	Assignment
01	A	14	*A
02	B	15	*B
03	/A (TTL)	16	/B (TTL)
04	+5V	17	GND
05	MAG1	18	MAG2
06	MAG3	19	MAG4
07	AXIS1	20	AXIS2
08	AXIS3	21	AXIS4
09	DO18	22	EMG2
10	EMG1	23	EMG4
11	EMG3	24	24V
12	24V	25	COM
13	COM		

Fig.6-10: Pin assignment J14

## Signal connection diagram

1. Output of type open collector

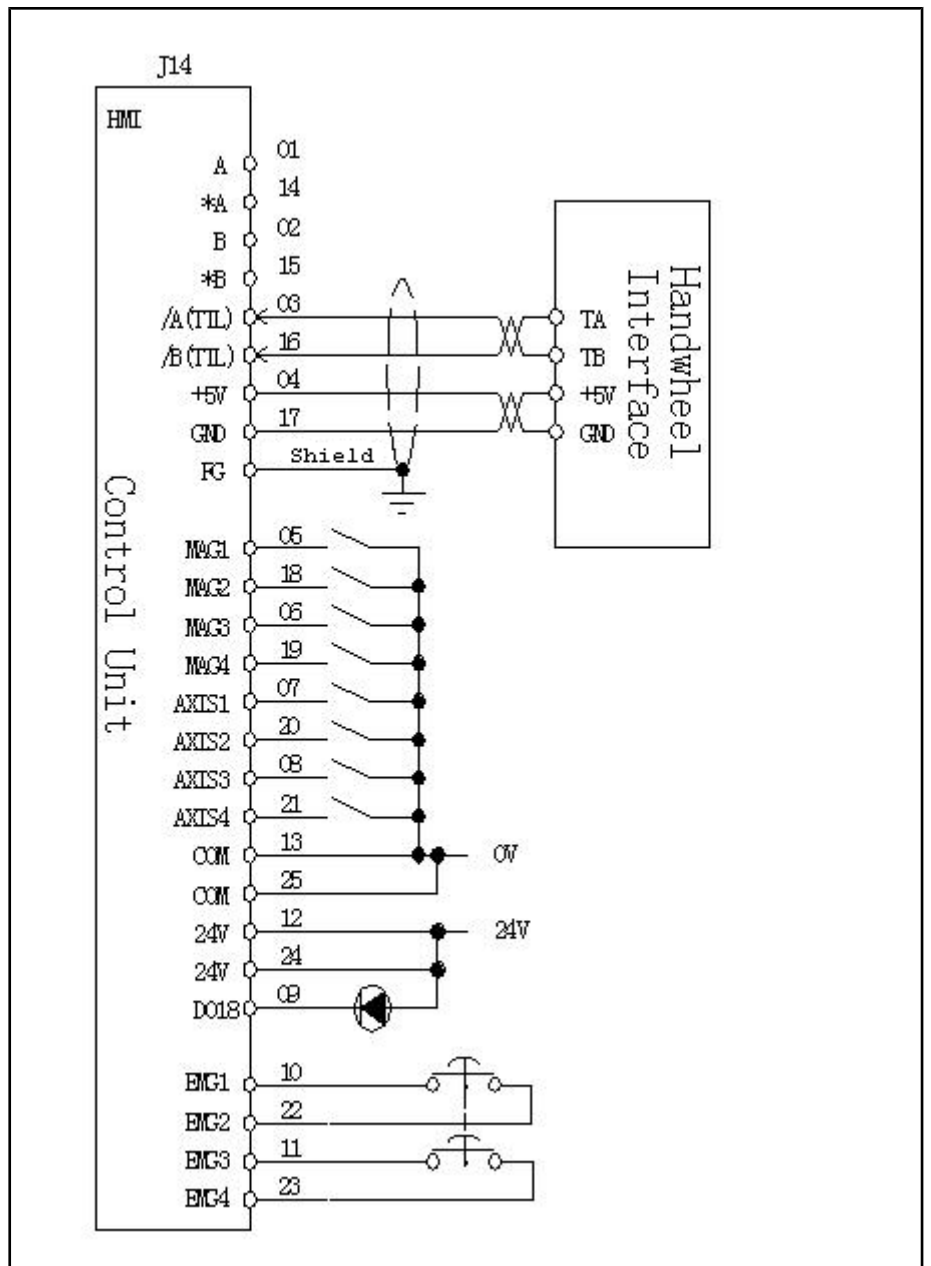


Fig.6-11: Handwheel unit - Output of type open collector

## Connections and Interfaces

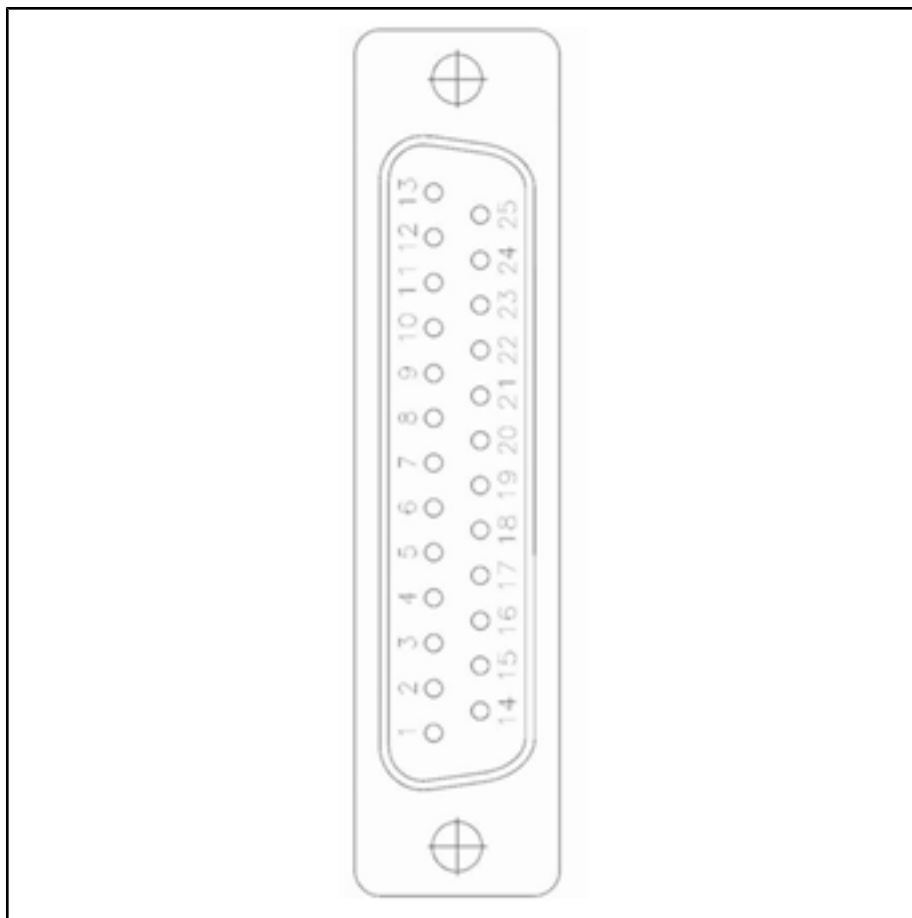


Fig.6-12: Handwheel unit - Output interface

**Check grounding terminals!**

All power supply terminals (GND) have to be interconnected.  
Check the connections!

2. Input of type differential

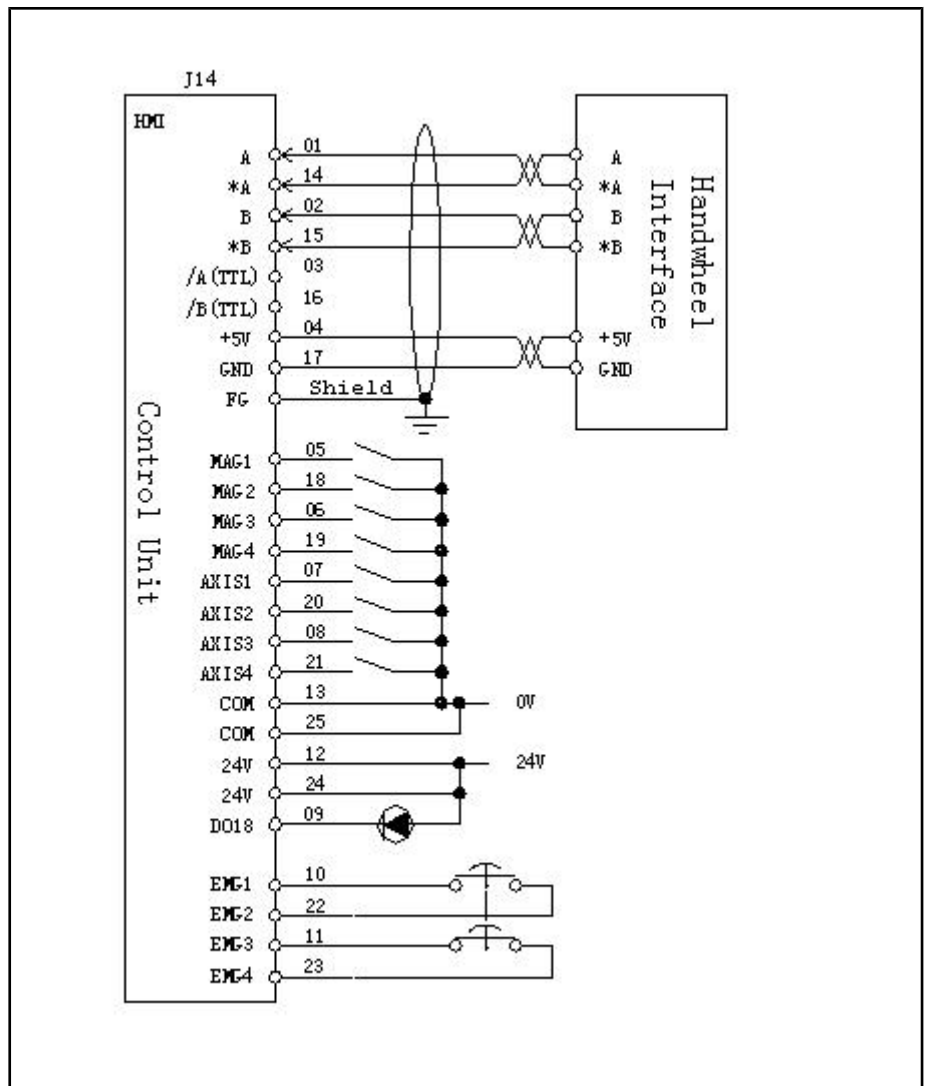


Fig.6-13: Handwheel unit - Input of type differential



**Check grounding terminals!**

All power supply terminals (GND) have to be interconnected.  
Check the connections!

**Signal description**

Signal description	Description
A	Differential signal A-phase handwheel
*A	Differential signal *A-phase handwheel
B	Differential signal B-phase handwheel
*B	Differential signal *B-phase handwheel
/A (TTL)	TA-signal handwheel
/B (TTL)	TB-signal handwheel
+5V	Handwheel +5V
GND	Handwheel GND

## Connections and Interfaces

Signal description	Description
MAG1	Handwheel override Select 1
MAG2	Handwheel override Select 2
MAG3	Handwheel override Select 3
MAG4	Handwheel override Select 4
AXIS1	Handwheel axis selection 1
AXIS2	Handwheel axis selection 2
AXIS3	Handwheel axis selection 3
AXIS4	Handwheel axis selection 4
24V	Control, power source +24V
COM	Control, GND
DO18	Logic instruction handwheel
EMG1	Emergency Stop Pin
EMG2	Emergency Stop Pin
EMG3	Emergency Stop Pin
EMG4	Emergency Stop Pin

## 6.6 Emergency Stop in Interface for Handwheel Unit

Pin assignment J19

Pin no.	Assignment
01	EMG1
02	EMG2
03	EMG3
04	EMG4

Fig. 6-14: Pin assignment J19

Signal connection diagram

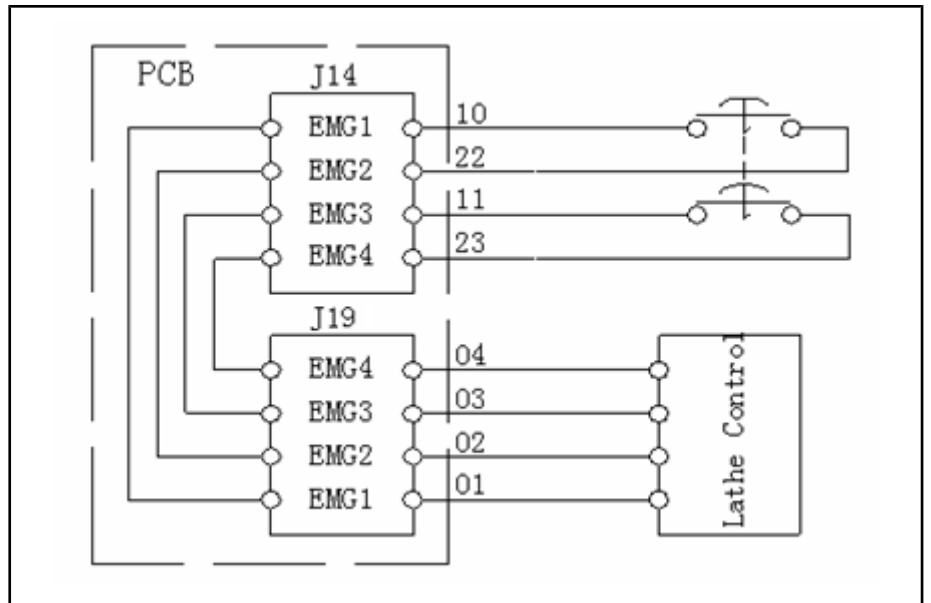


Fig.6-15: Emergency Stop in handwheel unit signal connection

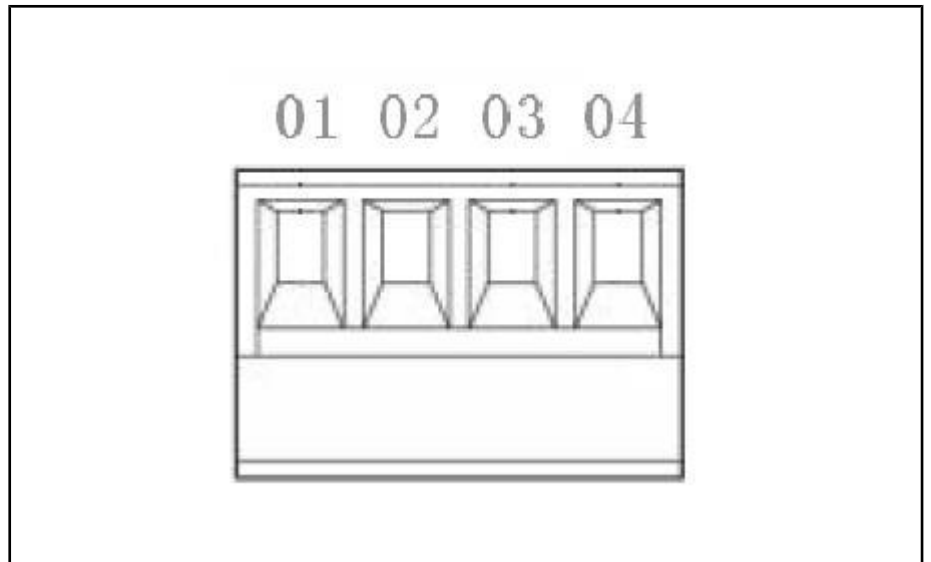


Fig.6-16: Connecting the Emergency Stop interface in the handwheel unit

Signal description

Signal description	Description
EMG1	Emergency Stop Pin
EMG2	Emergency Stop Pin
EMG3	Emergency Stop Pin
EMG4	Emergency Stop Pin

Connections and Interfaces

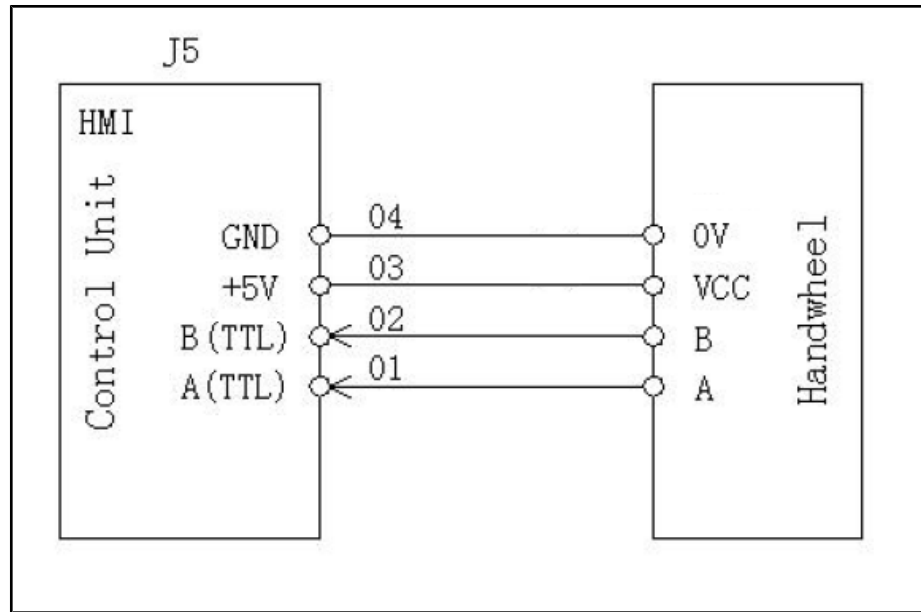


Fig.6-17: Handwheel unit signal interfaces

## 6.7 Handwheel extended interface (only Universal operator panel)

Pin assignment

Pin no.	Assignment
04	GND
03	+5V
02	B (TTL)
01	A (TTL)

Fig.6-18: Pin assignment J20

Signal connection diagram

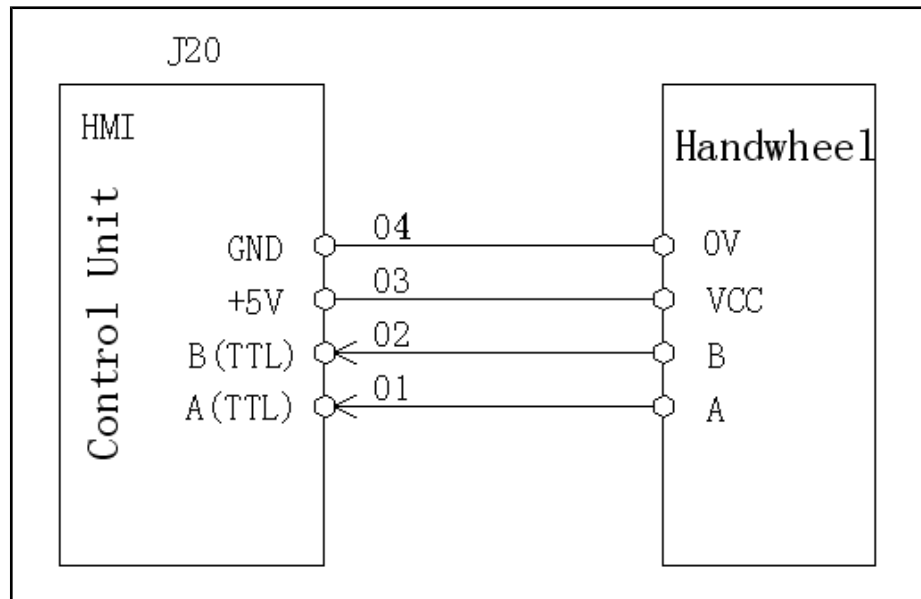


Fig.6-19: Signal connection diagram J20



## Connections and Interfaces

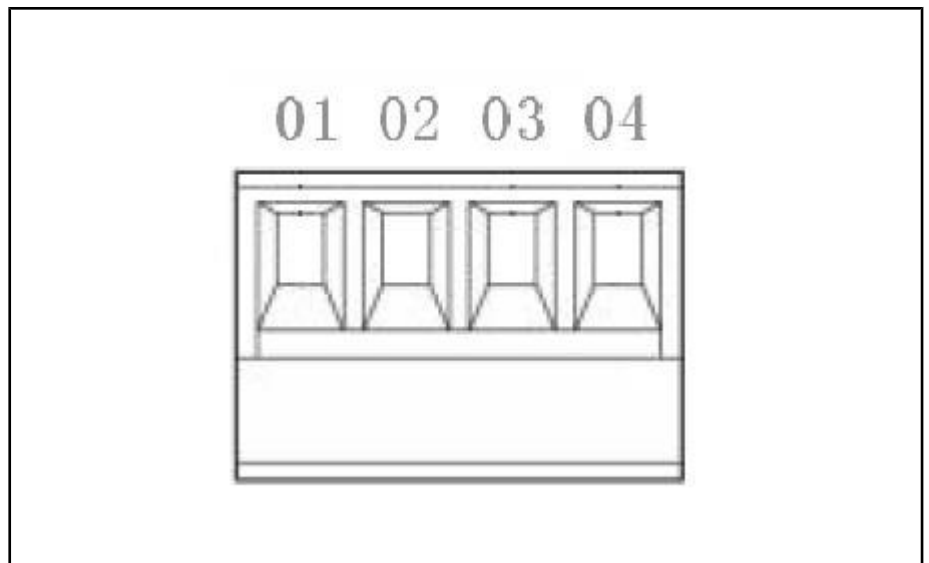


Fig.6-20: Signal connection J20

**Signal description**

Signal description	Description
GND	Handwheel GND
+5V	Handwheel +5V
A (TTL)	TA signal handwheel
B (TTL)	TB signal handwheel

Fig.6-21:



## 7 Universal HMI Panel

### 7.1 Labeling Strips

There are 4 labeling strips that can be changed by the user. The labeling strips are inserted at the back of the Universal panel

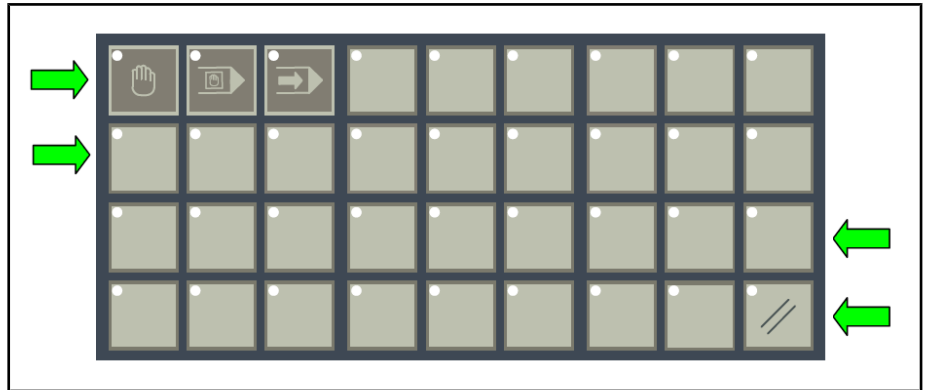


Fig.7-1: Inserting direction of strip

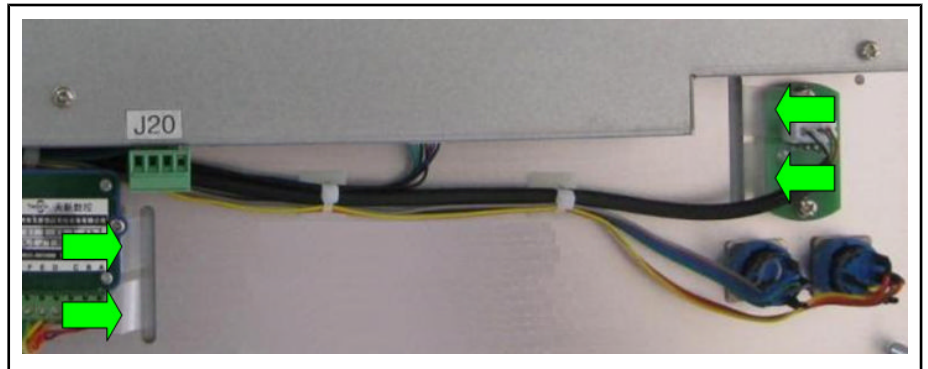


Fig.7-2: Inserting direction of strip from the back

### 7.2 Labeling the Labeling Strips

The Universal panel is equipped with labeled labeling strips by default. These labeling strips are printed with standard symbols of the milling operator panel.

- When changing the labeling strip, please note that the 32 operator panel keys can be changed by the user. 4 operator panel keys are already assigned on the operator panel (Manual, MDI, Auto and Reset)
- Bosch Rexroth provides a printer template to allow the user to print his own labeling strips. All currently available symbols are provided as bit-maps. This template can be downloaded on the Bosch Rexroth webpage.
- The sheet type used to print the labeling strips is specified in the template or the documentation

The template or the documentation contains information about the manufacturer and the order number of the sheets.

With each equipped Universal operator panel, 2 blank sheets are provided to print the labeling strips. The sheet format is DIN A4.

A standard laser printer is required to print the sheets.



# 8 Order Information

## 8.1 Type Designation Code

The HMI operator panel VDP 80.1 is available in different variants under the following type designation code:

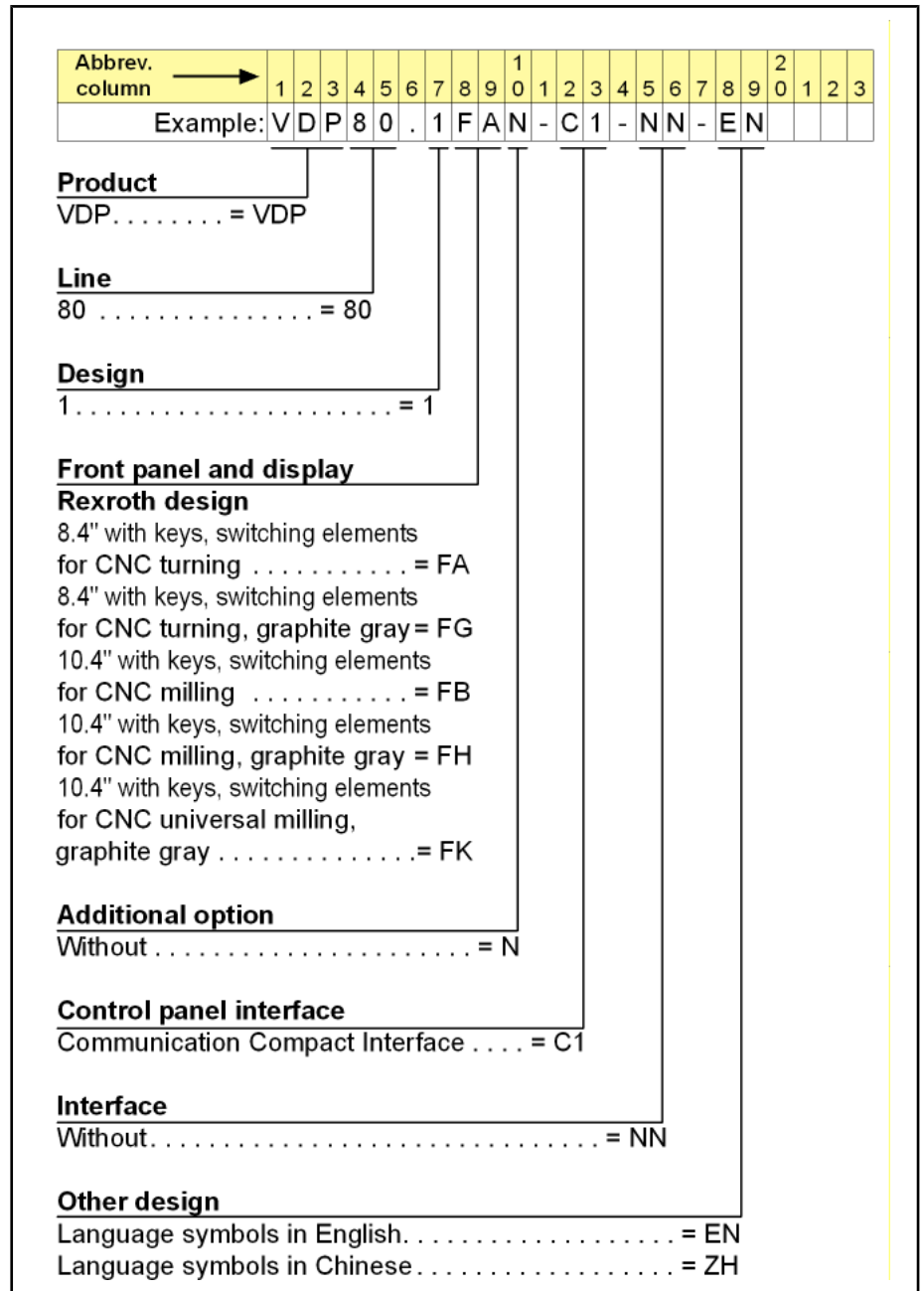


Fig.8-1: Type designation code

## 8.2 Connecting Cables

Data exchange cable to connect the HMI operator panel to MTX micro.

## Order Information

Product key	Material number	Description
RKB0030/000,0	R911327086	Data exchange cable, different lengths (max. 10 m)

*Fig. 8-2: Connecting cable for VDP 80.1*

## 9 Accessory

### 9.1 Hand-Held Terminal VCH02 Handwheel

#### Order information

Material number	R911328584
Type	VCH02.1NNN-000RS

Fig.9-1: Order information

#### Technical parameters

Operating voltage	DC 5 V $\pm$ 0.25 V	
Power consumption	< 150 mA	
Output signals	H	> 2.5 V
	L	< 0.5 V
Max. input current	20 mA	
Rise/fall time	200 ns	
Max. output frequency	5 KHz	
Dwell torque	$2 \cdot 10^{-2}$ - $6 \cdot 10^{-2}$ Nm	
Permissible load	Radial : 20 N	
	Axial : 10 N	
Speed	max. 200 min <sup>-1</sup>	
Operating temperature	-10°C - 70 °C	
Storage temperature	-30°C - 85 °C	
Air humidity during operation	30 - 85 % (no dew)	
Vibration	50 m/s <sup>2</sup> , 10 ~ 200 Hz, 1 h in each position XYZ	
Shock	980 m/s <sup>2</sup> , 6 ms 2 * in XYZ direction	
Weight	0.65 Kg	

Fig.9-2: Technical parameters

Max. load AC	AC 220 V 0.5 A
Max. load DC	DC 30 V 1 A
Min. load DC	DC 5 V 1 mA

Fig.9-3: Data for Emergency Stop switch

#### Interface assignment

Pin no.	Color of wire	Signal	Element
1	Red	+5V	Pulse Generic Machine
2	Black	0V	
3	Green	A	
4	White	B	
*3 (or 20)	Purple	$\bar{A}$	Line Driver Output
*4 (or 21)	Purple/black	B	

## Accessory

5	Green/Black	+	LED display
6	White/black	-	
7	Yellow	X	Axis selection
8	Yellow/black	Y	
9	Brown	Z	
10	Brown/black	4	
11	Grey	X1	Factor for motion
12	Grey/black	X10	
13	Orange	X100	
14	Orange/black	COM	
15	Metal blue	C	Emergency Stop
16	Metal blue/black	CN	
19	Pink	C'	
17	Pink/black	CN'	
18	Red/black		Reserved
Shield			N.C.

*Fig.9-4: Interface assignment*



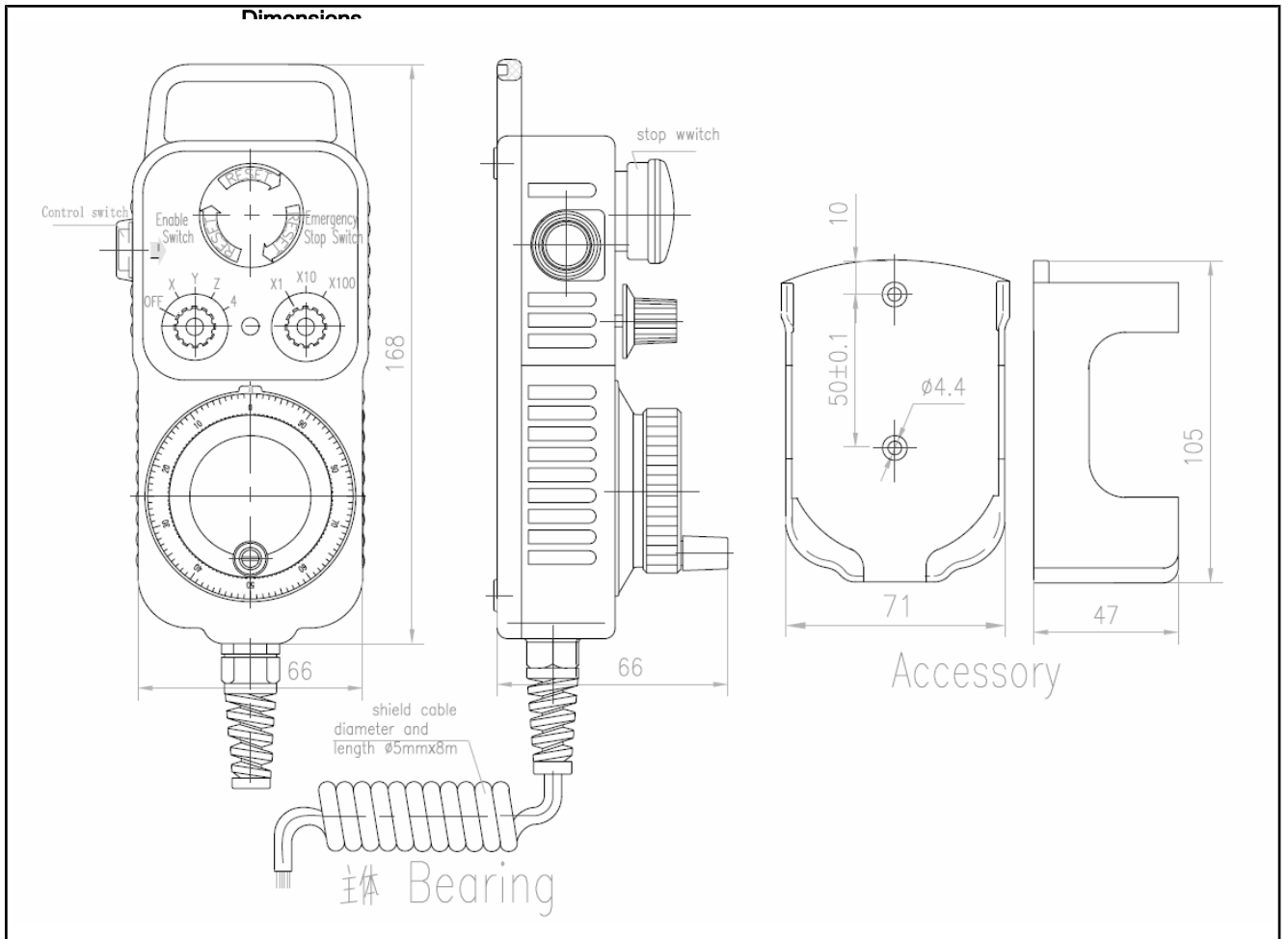


Fig.9-5: Dimensions



## 10 Service and Support

Our service helpdesk at our headquarters in Lohr, Germany and our worldwide service will assist you with all kinds of enquiries. You can reach us **around the clock - even on weekend and on holidays**.

	Helpdesk	Service Hotline Worldwide
Phone	+49 (0) 9352 40 50 60	Outwith Germany please contact our sales/service office in your area first.
Fax	+49 (0) 9352 40 49 41	
E-mail	<a href="mailto:service.svc@boschrexroth.de">service.svc@boschrexroth.de</a>	For hotline numbers refer to the sales office addresses on the Internet.
Internet	<a href="http://www.boschrexroth.com">http://www.boschrexroth.com</a> You will also find additional notes regarding service, maintenance (e.g. delivery addresses) and training.	

### Preparing Information

For quick and efficient help please have the following information ready:

- Detailed description of the fault and the circumstances
- Information on the type plate of the affected products, especially type codes and serial numbers
- Your phone, fax numbers and e-mail address so we can contact you in case of questions.



# Index

## A

About this documentation.....	3
Representing information .....	5
Validity of the documentation .....	3
Appropriate use.....	7
Areas of application .....	7

## C

CE Conformity Marking.....	28
Connecting the extended interface	
Signal description .....	39
Connecting the extended IO interface.....	37
Pin assignment .....	37
Signal connection diagram .....	38
Connections and interfaces.....	35

## D

Design.....	31
Operating elements .....	33
Overview .....	31
Drive system.....	9

## E

Electric drive system.....	9
Emergency Stop in interface for handwheel unit	
Pin assignment .....	44
Signal connection diagram .....	45
Signal description .....	45
Emergency stop in interface for handwheel unit	44

## I

Inappropriate use.....	8
Consequences, liability damage waiver .....	7
Interface connection data exchange.....	35
Pin assignment .....	35
Signal connection diagram .....	36
Signal description .....	36
Interface connection HMI of operator panel	
power supply.....	35
Interface connection of handwheel unit.....	39
Pin assignment .....	39
Signal connection diagram .....	40
Signal description .....	43

## I

Interface connection of HMI operator panel	
power supply	
Detailed description .....	35
Pin assignment .....	35

## L

List of system interfaces.....	31
--------------------------------	----

## O

Order information.....	51
Connecting cables .....	51
Type designation code .....	51

## P

PELV.....	14
Protective extra-low voltage.....	14

## S

Safety instructions for electric drives and controls.....	9
Standards.....	28
State-of-the-art technology.....	7
Support	
see Service Hotline .....	57
System installation.....	21
Dimensions .....	21
Grounding the VDP 80.1 .....	27
Section .....	26
System installation environment .....	26
Technical data .....	27
Technical data, display .....	27
Technical data, standards .....	28
Technical data, weight .....	28

## U

UL approval.....	28
USB interface.....	36
Pin assignment .....	36
Signal connection diagram .....	37

## Use

Appropriate use .....	7
Inappropriate use .....	8

## V

VDP 80.1, connection diagram.....	32
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# Notes

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